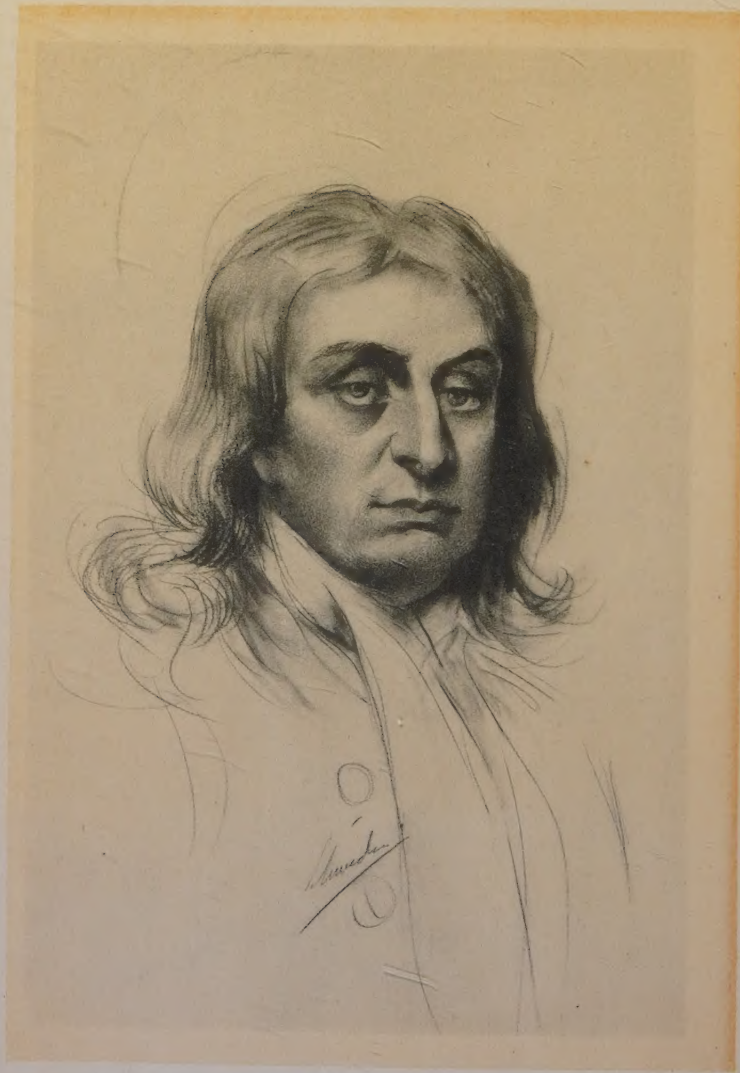

# Little Journeys

To the Homes
of

## Great Scientists

Elbert Hubbard

## Memorial Edition

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# Little Journeys
## To the Homes of Great Scientists

# SIR ISAAC NEWTON

When you come into any fresh company, observe their humours. Suit your own carriage thereto, by which insinuation you will make their converse more free and open. Let your discours be more in querys and doubtings than peremptory assertions or disputings, it being the designe of travelers to learne, not to teach. Besides, it will persuade your acquaintance that you have the greater esteem of them, and soe make them more ready to communicate what they know to you; whereas nothing sooner occasions disrespect and quarrels than peremptorinesse. You will find little or no advantage in seeming wiser, or much more ignorant than your company. Seldom discommend anything though never so bad, or doe it but moderately, lest you bee unexpectedly forced to an unhansom retraction. It is safer to commend any thing more than is due, than to discommend a thing soe much as it deserves; for commendations meet not soe often with oppositions, or, at least, are not usually soe ill resented by men that think otherwise, as discommendations; and you will insinuate into men's favour by nothing sooner than seeming to approve and commend what they like; but beware of doing it by a comparison.

*—Sir Isaac Newton to one of his pupils*

# SIR ISAAC NEWTON

AN honest farmer, neither rich nor poor, was Isaac Newton. He was married to Harriet Ayscough in February, Sixteen Hundred Forty-two ℵ ℵ

Both were strong, intelligent and full of hope. Neither had any education to speak of; they belonged to England's middle class—that oft-despised and much ridiculed middle class which is the hope of the world. Accounts still in existence show that their income was thirty pounds a year. It was for them to toil all the week, go to church on Sunday, and twice or thrice in a year attend the village fairs or indulge in a holiday where hard cider played an important part.

Isaac had served his two years in the army, taken a turn at sea, and got his discharge-papers. Now he had married the lass of his choice, and settled down in the little house on an estate in Lincolnshire where his father was born and died.

Spring came and the roses clambered over the stone walls; the bobolinks played hide-and-seek in the waving grass of the meadows; the skylarks sang and poised and soared; the hedgerows grew white with hawthorn-blossoms and musical with the chirp of sparrows; the cattle ranged through the fragrant clover "knee-deep

in June." ¶ Oftentimes the young wife worked with her husband in the fields, or went with him to market. Great plans were laid as to what they would do next year, and the year after, and how they would provide for coming age and grow old together, here among the oaks and the peace and plenty of Lincolnshire ☙ ☙

In such a country, with such a climate, it seems as if one could almost make repair equal waste, and thus keep death indefinitely at bay. But all men, even the strongest, are living under a death sentence, with but an indefinite reprieve. And even yet, with all of our science and health, we can not fully account for those diseases which seemingly pick the very best flower of sinew and strength.

Isaac Newton, the strong and rugged farmer, sickened and died in a week. " The result of a cold caught when sweaty and standing in a draft," the surgeon explained. " The act of God to warn us all of the vanity of life." Acute pneumonia, perhaps, is what we would call it —a fever that burned out the bellows in a week.

In such cases the very strength of the man seems to supply fuel for the flames. And so just as the Autumn came with changing leaves, the young wife was left to fight the battle of life alone—alone, save for the old, old miracle that her life supported another. A wife, a widow, a mother—all within a year!

On Christmas-Day the babe was born—born where

most men die: in obscurity. He was so weak and frail that none but the mother believed he would live.

The doctor quoted a line from " Richard the Third," " Sent before my time into this breathing world scarce half made up," and gave the infant into the keeping of an old nurse with an ominous shake of the head, and went his way, absolved. His time was too valuable to waste on such a useless human mite.

The persistent words of the mother that the child should not, must not die, possibly had something to do with keeping the breath of life in the puny man-child. The fond mother had given him the name of his father, even before birth! He was to live to do the work that the man now dead had hoped to do; that is, live a long and honest life, and leave the fair acres more valuable than he found them.

Such was the inauspicious beginning of what Herbert Spencer declared was the greatest life since Aristotle studied the starry universe.

# SIR ISAAC NEWTON

OUTSIDE of India the lot of widows is not especially to be pitied. A widow has beautiful dreams, while the married woman copes with the stern reality.

Then, no phase of life is really difficult when you accept it; and the memory of a great love lost is always a blessing and a benediction to the one who endures the first cruel shock.

The young widow looked after her little estate, and with perhaps some small assistance from her parents, lived comfortably and as happily as one has a right to in this vale of tears. Her baby boy had grown strong and well: by the time he was two years old he was quite the equal of most babies—and his mother thought, beyond them.

It is quite often stoutly declared by callow folks that mother-love is the strongest and most enduring love in the world, but the wise waste no words on such an idle proposition. Mother-love retires into the shadow when the other kind appears.

When the Reverend Barnabas Smith began, unconsciously, to make eyes at the Widow Newton over his prayer-book, the good old dames whose business it is to look after these things, and perform them vicariously, made prophecies on the way home from church as to how soon the wedding would occur ☙ People go to church to watch and pray, but a man I know says that women go to church to watch. Young

clergymen fall an easy prey to designing widows, he avers. I can discover no proof, however, that the Widow Newton made any original designs; she was below the young clergyman in social standing, and when the good man began to pay special attentions to her baby boy she never imagined that the sundry pats and caresses were meant for her.

Little Isaac Newton was just three years old when the wedding occurred, and was not troubled about it. The bride went to live with her husband at the rectory, a mile away, and the little boy in dresses, with long yellow curls, was taken to the home of his grandmother. The Reverend Barnabas Smith did n't like babies as well as he had at first thought. Grandparents are inclined to be lax in their discipline. And anyway it is no particular difference if they are: a scarcity of discipline is better than too much. More boys have been ruined by the rod than saved by it—love is a good substitute for a cat-'o-nine-tails.

There were several children born to the Reverend Barnabas Smith and his wife, and all were disciplined for their own good. Isaac, a few miles away, snuggled in the arms of his old grandmother when he was bad and went scot-free.

Many years after, Sir Isaac Newton, in an address on education at Cambridge, playfully referred to the fact that in his boyhood he did not have to prevaricate to escape punishment, his grandmother being

always willing to lie for him. His grandmother was his first teacher and his best friend as long as she lived. ¶ When he was twelve years old he was sent to the village school at Grantham, eight miles away. There he boarded with a family by the name of Clark, and at odd times helped in the apothecary-shop of Mr. Clark, cleaning bottles and making pills. He himself has told us that the working with mortar and pestle, cutting the pills in exact cubes, and then rolling one in each hand between thumb and finger, did him a lot of good, whether the patients were benefited or not

The genial apothecary also explained that pills were for those who made and sold them, and that if they did no harm to those who swallowed them, the whole transaction was then one of benefit. All of which proves to us that men had the essence of wisdom two hundred years ago, quite as much as now.

The master of the school at Grantham was one Mr. Stokes, a man of genuine insight and tact—two things rather rare in the pedagogic equipment at that time. The Newton boy was small and stood low in his class, perhaps because book-learning had not been the bent of his grandmother. The fact that Isaac was neither strong nor smart, nor even smartly dressed, caused him to serve in the capacity of a butt for the bullies. ¶ One big boy in particular made it his business to punch, kick and cuff him on all occasions, in class or

out. This continued for a month, when one day the little boy invited the big one out into the churchyard and there fell upon him tooth and claw. The big boy had strength, but the little one had right on his side. ¶ The schoolmaster looked over the wall and shouted, "Thrice armed is he who knows his cause is just!" In two minutes the bully was beaten, but the schoolmaster's son, who stood by as master of ceremonies, suggested that the big boy have his nose rubbed against the wall of the church for luck. This was accordingly done, not o'er-gently, and when Isaac returned to the schoolroom, the master, who was supposed to know nothing officially of the fighting, prophesied, "Young Mr. Newton will yet beat any boy in this school in his studies."

It has been suggested that this prophecy was made after its fulfilment, but even so, we know that Mr. Stokes lived long enough to take great pride in the Newton boy, and to grow reminiscent concerning his great achievements.

Our hearts surely go out to the late Mr. Stokes, schoolmaster at Grantham.

# SIR ISAAC NEWTON

THERE is surely something in that old idea of Indians that when they killed an enemy the strength of the fallen adversary entered into themselves.

This encounter of little Isaac with the school bully was a pivotal point in his career. He had vanquished the rogue physically, and he now set to work to do as much mentally for the whole school. He had it in him —it was just a matter of application.

Once, in after-life, in speaking of those who had benefited him most, he placed this unnamed chucklehead first, and added with a smile, " Our enemies are quite as necessary to us as our friends."

In a few months Isaac stood at the head of the class. In mathematics he especially excelled, and the Master, who prided himself on being able to give problems no one could solve but himself, found that he was put to the strait of giving a problem nobody could solve. He was somewhat taken aback when little Isaac declined to work on it, and coolly pointed out the fallacy involved. The only thing for the teacher to do was to say he had purposely given the proposition to see if any one would detect the fallacy. This he gracefully did, and again made a prophecy to the effect that Isaac Newton would some day take his own place and be master of Grantham School.

In the year Sixteen Hundred Fifty-six the schooldays of Isaac Newton were cut short by the death of his

stepfather. ¶ His mother, twice a widow, moved back to " Woolsthorpe," a big name for a very small estate. Isaac was made the man of the house. The ambition of his mother was that he should become a farmer and stock-raiser.

It seems that the boy entered upon his farm duties with an alacrity that was not to last. His heart was not in the work, but the desire to please his mother spurred him forward.

On one occasion, being sent with a load of produce to Grantham, he stopped to visit his old school, and during his call struck a bargain with one of the boys for a copy of Descartes' Geometry. The purchase exhausted his finances, so that he was unable to buy the articles his mother had sent him for, but when he got home he explained that one might get along without such luxuries as clothing, but a good Geometry was a family necessity. About this time he made a water-clock, and also that sundial which can be seen today, carved into the stone on the corner of the house. He still continued his making of kites which had been begun at Grantham; and gave the superstitious neighbors a thrill by flying kites at night with lighted lanterns made from paper, attached to the tails. He made water-wheels and windmills, and once constructed a miniature mill that he ran by placing a mouse in a treadmill inside. ¶ In the meantime the cows got into the corn, and the weeds in the garden improved each shining hour. The

fond mother was now sorely disappointed in her boy, and made remarks to the effect that if she had looked after his bringing up instead of entrusting him to an indulgent grandmother, affairs at this time would not be in their present state. Parents are apt to be fussy: they can not wait.

Matters reached a climax when the sheep that Isaac had been sent to watch, overran the garden and demolished everything but the purslane and ragweed, while all the time the young man was under the hedge working out mathematical problems from his Descartes.

At this stage the mother called in her brother, the Reverend Mr. Ayscough, and he advised that a boy who was so bound to study should be allowed to study. ¶ And the good man offered to pay the wages of a man to take Isaac's place on the farm.

So, greatly to the surprise and pleasure of Mr. Stokes of Grantham, Isaac one fine day returned with his books, just as if he had only been gone a day instead of a year.

At the home of the apothecary the lad was thrice welcome. He had endeared himself to the women of the household especially. He did not play with other boys—their games and sports were absolutely outside of his orbit. He was silent and so self-contained that he won from his schoolfellows the sobriquet of "Old Coldfeet." Nothing surprised him; he never lost his temper; he laughed so seldom that the incident was

noted and told to the neighbors; his attitude was one of abstraction, and when he spoke it was like a judge charging a jury with soda-water.

All his spare time was given up to whittling, pounding, sawing, and making mathematical calculations.

Not all of his inventions were toys, for among other things he constructed a horseless carriage which was run by a crank and pumping device, by the occupants.

¶ The idea of the horseless carriage is a matter that has long been in the minds of inventors.

Several men, supremely great, have tried their hands and head at it. Leibnitz worked at it; Swedenborg prophesied the automobile, and made a carriage, placing the horse inside, and did not give up the scheme until the horse ran away with himself and demolished a year's work. The government here interfered and placed an injunction against " the making of any more such diabolical contrivances for the disturbance of the public peace." All of which makes us believe that if either Edison or Marconi had lived two hundred years ago, the bailiffs would have looked after them with the butt end of the law for the regulation of wizards and witches—wizards at Menlo Park being as bad as witches at Salem.

Newton's horseless carriage later came to grief in a similar way to Swedenborg's invention—it worked so well and so fast that it turned a complete somersault into a ditch, and its manipulation was declared to be a

pastime more dangerous than football. ¶ Not all the things produced by Isaac about this time were failures. For instance, among other things he made a table, a chair and a cupboard for a young woman who was a fellow-boarder at the apothecary's. The excellence of young Newton's handiwork was shown in that the articles just mentioned outlasted both owner and maker.

# SIR ISAAC NEWTON

MUCH of the reminiscence concerning the Grantham days of Sir Isaac Newton comes from the fortunate owner of that historic old table, chair and cupboard. This was Mary Story, who was later Mrs. Vincent.

Miss Story was the same age as Isaac. She was just eighteen when the furniture was made roycroftie—she was a young lady, grown, and wore a dress with a train; moreover, she had been to London and had been courted by a widower, while Isaac Newton was only a lad in roundabouts.

Age counts for little—it is experience and temperament that weigh in the scale. Isaac was only a little boy, and Mary Story treated him like one. And here seems a good place to quote what Doctor Charcot said, " In arranging the formula for a great man, make sure you delay adolescence: rareripes rot early."

Isaac and Mary became very good chums, and used to ramble the woods together hand in hand, in a way that must have frightened them both had they been on the same psychic plane. Isaac had about the same regard for her that he might have had for a dear maiden aunt who would mend his old socks and listen patiently, pretending to be interested when he talked of parallelograms and prismatic spectra. But evidently Mary Story thought of him with a thrill, for she stoutly resented the boys calling him " Coldfeet."

In due time Isaac gravitated to Cambridge. Mary

mooed a wee, but soon consoled herself with a sure-enough lover, and was married to Mr. Vincent, a worthy man and true, but one who had not sufficient soul-caloric to make her forget her Isaac.

This friendship with Mary Story is often spoken of as the one love-affair in the life of Sir Isaac Newton. It was all prosily Platonic on his part, but as Mary lived out her life at Grantham, and Sir Isaac Newton used to go there occasionally, and when he did, always called upon her, the relationship was certainly noteworthy ☙ ☙

The only break in that lifelong friendship occurred when each was past fifty.

Sir Isaac Newton was paying his little yearly call at Grantham; and was seated in a rustic arbor by the side of Mrs. Vincent, now grown gray, and the mother of a goodly brood, well grown up. As they thus sat talking of days agone, his thoughts wandered off upon quadratic equations, and to aid his mind in following the thread, he absent-mindedly lighted his pipe, and smoked in silence. As the tobacco died low, he gazed about for a convenient utensil to use in pushing the ashes down in the bowl of his pipe. Looking down he saw the lady's hand resting upon his knee, and he straightway utilized the forefinger of his vis-a-vis. A suppressed feminine screech followed, but the fires of friendship were not quenched by so slight an incident, which Mrs. Vincent knew grew out of temperament,

and not from wrong intent. ¶ She lived to be eighty-five, and to the day of her death caressed the scar—the cicatrice of a love-wound. All of which seems to prove that old women can be quite as absurd as young ones—goodness me!

WHEN Isaac was eighteen, Master Stokes was so well impressed with his star scholar that he called in the young lad's uncle, the Reverend Mr. Ayscough, and insisted that the boy be sent to Cambridge. The uncle being a Cambridge man himself thought this the proper thing to do.

¶ On June Fifth, Sixteen Hundred Sixty-one, Isaac presented his credentials from his uncle and Mr. Stokes, and was duly entered in Trinity College as a subsizar, which means that he was admitted on suspicion. A part of the duties of a subsizar was to clean boots, scrub floors and perform various other delightful tasks which everybody else evaded.

To be at Trinity College in any capacity was paradise for this boy. He thirsted for knowledge: to know, to do, to perform—these things were his desire. He had been brought up to work, anyway, and to a country boy toil is no punishment. " I knew that if worse came to worst I could get work in the town making furniture and earn a man's wage," he said.

In a month he had passed his first examinations and was made a sizar. Before this he had been fag to everybody, but now he was fag to the Seniors only. He not only made their beds and cleaned their rooms, but also worked their examples in mathematics, and thus commanded their respect.

Once, being called upon in class to recite from Euclid, he declined and shocked the professor by saying, " It

is a trifling book—I have mastered it and thrown it aside." And it was no idle boast—he knew the book as the professor did not. When he arrived at Cambridge, he carried in his box a copy of Sanderson's Logic presented to him by his uncle—the uncle having no use for it. It happened to be one of the textbooks in use at Trinity. When Isaac heard lectures on Sanderson he found he knew the book a deal better than the tutor, a thing the tutor shortly acknowledged before the class. This caused young Mr. Newton to stand out as a prodigy. Usually students have to rap for admittance to the higher classes, but now the teachers came and sought him out. One professor told him he was about to take up Kepler's Optics with some post-graduate students—would young Mr. Newton come in? Isaac begged to be excused until he could examine the book. The volume was loaned to him. He tore the vitals out of it and digested them. When the lectures began, he declined to go because he had mastered the subject as far as Kepler carried it.

Genius seems to consist in the ability to concentrate your rays and focus them on one point. Isaac Newton could do it. "On a Winter day I took a small glass and so centered the sun's rays that I burned a hole in my coat," he wrote in his subsizar journal.

The youth possessed an imperturbable coolness: he talked little, but when he spoke it was very frankly and honestly. From any other his words would have

had a presumptuous and boastful sound. As it was he was respected and beloved. At Cambridge his face and features commended him: he looked like another Cambridge man, one Milton—John Milton—only his face was a little more stern in its expression than that of the author of "Paradise Lost."

In two years' time Isaac Newton was a scholar of whom all Cambridge knew. He had prepared able essays on the squaring of curved and crooked lines, on errors in grinding lenses and the methods of rectifying them, and in the extraction of roots where the cubes were imperfect: he had done things never before attempted by his teachers. When they called upon him to recite, it was only for the purpose of explaining truths which they had not mastered.

In Sixteen Hundred Sixty-four, being in his twenty-second year, Isaac Newton was voted a free scholarship, which provided for board, books and tuition. On this occasion he was examined in Euclid by Doctor Barrow, the Head Master of Trinity.

Newton could solve every problem, but could not explain why or how. His methods were empirical—those of his own.

Many men with a modicum of mathematical genius work in this way, and in practical life the plan may serve all right. But now it was shown to Newton that a schoolman must not only know how to work out great problems, but also why he goes at it in a certain

way; otherwise, colleges are vain—we must be able to pass our knowledge along. The really great man is one who knows the rules and then forgets them, just as the painter of supreme merit must be a realist before he evolves into an impressionist.

Newton now acknowledged his mistake in reference to Euclid, and set to work to master the rules. This graciousness in accepting advice, and the willingness to admit his lapse, if he had been hasty, won for him not only the scholarship, but also the love of his superiors. Milton was a radical who made enemies, but Newton was a radical who made friends. He avoided iconoclasm, left all matters of theology to the specialists, and accepted the Church as a necessary part of society. His care not to offend fixed his place in Cambridge for life.

It was Cambridge that fostered and encouraged his first budding experiments; it was there he was sustained in his mightiest hazards; and it was within her walls that the ripe fruit of his genius was garnered and gathered. When his fame had become national and he was called to higher offices than Cambridge supplied, Cambridge watched his career with the loving interest of a mother, and the debt of love he fully paid, for it was very largely through his name and fame that Cambridge first took her place as one of the great schools of the world.

NEWTON took his degree of Bachelor of Arts at Cambridge, in January, in the year Sixteen Hundred Sixty-five. The faculty of Trinity would not even consider his leaving the college: he was as valuable to them as he would be now if he were a famous football-player. Besides the scholarship, there were ways provided so he could earn money by private tutoring and giving lectures in the absence of the professors.

He had written his essay on fluxions, described their application to fluents and tangents, and devised a plan for finding the radius of curvity in crooked lines. In August of the same year that Newton was given his degree, the college was dismissed on account of an epidemic, and Newton went home to Woolsthorpe to kill time. In September, Sixteen Hundred Sixty-five, he then being twenty-three, while seated in his mother's garden, Newton saw that storied apple fall. What pulled it down? Some force tugging at it, surely! ¶ Galileo had experimented with falling bodies, and had proved that the weight and size of a falling body had nothing to do with its velocity, save as its size and shape might be affected by the friction of the atmosphere. The first person to put into print the story of the falling apple was Voltaire, whose sketch of Newton is a little classic which the world could ill afford to lose. Adam, William Tell and Isaac Newton each had his little affair with an apple, but with different

results. ¶ The falling apple suggested to Newton that there was some power in the ground that was constantly pulling things toward the center of the earth.

This power extended straight down into the earth—he knew it—he had dropped a stone into a mine, and had also dropped things from steeples. He dropped apples from kites by an ingenious device of two strings, and he concluded that an apple taken a hundred miles up in the air would return to earth.

He then began to speculate as to just what a body would do a thousand or ten thousand miles from the earth. So high as we could go, or as deep as we could dig, this drawing power was always present. The Law of Gravitation!

If a cannon-ball was fired in a straight line at a distant target, the gunner had to elevate the aim if he would hit the target, for the ball described a curve and would keep dropping to the earth until it struck the ground. Something was pulling it down: what was it? The Law of Gravitation!

The moon was attracted toward us and would surely fall into us, but for the fact that there were other attractions drawing her toward them. The movements of the planets were owing to the fact that they were obeying attractions. They were moving in curves, just like cannon-balls in motion. They had two movements, also, like the cannon-ball.

Newton had noticed that the stars within a certain

territory all moved in similar directions, and so must be acted upon by the same influences. The Law of Gravitation!

It is held by many people in East Aurora and elsewhere that Newton's invention is a devilish device originated for the benefit of surgeons and crockery-dealers. But this is not wholly true.

Without this Law of Gravitation the Earth could not retain her spherical shape: only through this constant drawing in toward the center could she exist. ¶ The other planets, too, must be round or they could not exist, and so they also had this same quality of gravity in common with the Earth—a drawing in of everything toward the center. Here was clearly a positive discovery—this similarity of the heavenly bodies! ℵ ℵ

Every one of the heavenly bodies was exerting a constant attraction toward all other heavenly bodies, and this attractive power must be in proportion to the distance they were from the object acted upon. Thus were their movements and orbits accounted for. ¶ At this time Newton was perfectly familiar with Kepler's Law, that the squares of the periodic times of a planet were as the cubes of its distance from the sun. And from this, he inferred that the attraction varied as the square of the planet's distance from the sun ℵ ℵ

Here he was working on territory that had never been

surveyed. At first, in his exuberance, he thought to figure out the size and weight of each planet quickly by measuring its attractive power. He did not realize that he had cut out for himself work that would require many men and several centuries to cover, but surely he was on the right scent—a finite man keen upon the secrets of the Infinite!

He was still at his mother's old home in the country, without scientific apparatus or the stimulus of colleagues, when we find by a record in his journal that antique groan because there were only twenty-four hours in a day, and that eight were required for sleep and eight more for recreation!

A subject a little nearer home than planetary attraction had now switched him off from measuring and weighing the stars. He was hard at work in his mother's little sitting-room, with the windows darkened, much to that good woman's perplexity.

By shutting out all light from the windows and allowing the sun's rays to enter by a little, circular aperture, he had gotten the sunlight captured and tamed where he could study it. This ray of light he examined with a small hand-glass he himself had made. In looking at the ray, quite accidentally, he found it could be deflected and sent off at will in various directions. When thrown on the wall, instead of being simply white light it had seven distinct colors beginning with violet and running down to red. So white light

was not a single element: it was made up of various rays which had to be united in order to give us sunlight. ¶ Eureka! He had found the secret of the rainbow—the sun's rays broken up and separated by the refracting agency of clouds!

Well does Darwin declare that the separation of sunlight into its component parts, and the invention of the spectrum, have marked an advance in man's achievement such as the world had not seen since the time of wonder-working Archimedes.

# SIR ISAAC NEWTON

THE Cambridge University was closed until October, year of Sixteen Hundred Sixty-seven. Most of the intervening time Newton spent at the home of his mother, but from accounts of his we can see that the College people kept their eagle-eye upon him, for they sent remittances to him regularly for " commons."

When he returned to Cambridge he was assigned to the " spiritual chamber," which was a room next to the chapel, that had formerly been reserved as a guest-room for visiting dignitaries.

In March, Sixteen Hundred Sixty-eight, he was given the degree of Master of Arts. His studies now were of a very varied kind. He was required to give one lecture a week on any subject of his own choosing. Needless to say his themes were all mathematical or scientific. Just what they were can best be inferred by consulting his cashbook, since the lectures themselves were not written out and all memoranda concerning them have disappeared. This account-book shows that his expenditures were for a Gunter's Book (he who invented the Gunter's Chain), a magnet and a compass, glue, bulbs, putty, antimony, vinegar, white lead, salts of tartar, and lenses.

And in addition there are a few interesting items such as one sees in the Diary of George Washington: " Lost at cards, five shillings." " Treating at tavern, ten shillings." " Binding my Bible, three shillings." ☙

" Spent on my cousin, one pound, two." " Expenses for wetting my degree, sixteen shillings."

The last item shows that times have changed but little: this scientist and philosopher par excellence had to moisten his diploma at the tavern for the benefit of good fellows who little guessed with whom they drank ℳ ℳ

He also had " poor relations " come to visit him; and it is significant that while there are various items showing where he lost money at cards, there are no references to any money won at the same business, from which we infer that while there was no one at Cambridge who could follow him in his studies, there yet were those who could deal themselves better hands when it came to the pasteboards.

Evidently he got discouraged at playing cards, for after the year Sixteen Hundred Sixty-eight, there are no more items of " treating at the tavern " or " lost at cards." The boys had tried to educate him, but had not succeeded. In card exploitations he fell a victim of arrested development.

I suppose it will not cause any one a shock to be told that " the greatest thinker of all time " was not exactly a perfect man.

So let the truth be known that throughout his life Newton had a well-defined strain of superstitious belief running through his character. He never quite relinquished the idea of transmutation of metals,

and at times astrology was quite as interesting to him as astronomy.

In writing to a friend who was about to pay a long visit to the mines of Hungary, he says, "Examine most carefully and ascertain just how and under what conditions Nature transforms iron into copper and copper into silver and gold."

In his laboratory he had specimens of iron ore that contained copper, and also samples of copper ore that contained gold, and from this he argued that these metals were transmutable, and really in the act of transmutation when the process was interfered with by the miner's pick.

He had transformed a liquid into a mass of solid crystals instantly, and all of the changes possible in light, which he had discovered, had enlarged his faith to a point where he declared, "Nothing is impossible."

¶ It is somewhat curious that Isaac Newton, who had no soft sex-sentiment in his nature, quite unlike Galileo, still believed in alchemy and astrology, while Galileo's cold intellect at once perceived the fallacy of these things

Galileo also saw at once that for the sun to stand still at Joshua's command would really mean that the Earth must cease her motion, since the object desired was to prolong the day. Sir Isaac Newton, who discovered the Law of Gravitation, yet believed that at the command of a barbaric chieftain, this Law was arrested,

and that all planetary attraction was made to cease while he fought the Philistines for the possession of pasture-land to which he had no title.

Galileo did not know as much as Newton about planetary attraction, but very early in his career he perceived that the Bible was not a book that could be relied upon technically ☙ ☙

With Newton the Bible presented no difficulties. He regularly attended church and took part in the ritual. Religion was one thing and his daily work another. He kept his religion as completely separate from his life as did Gladstone, who believed the Mosaic account of Creation was literally true, and yet had a clear, cool, calculating head for facts.

The greatest financial exploiter in America today is an Orthodox Christian, taking an active part in missionary work and the spread of the Gospel.

In his family he is gentle, kind and tender; he is a good neighbor, a punctilious churchgoer, a leader in Sunday-School, and a considerate teacher of little children. ¶ In business relations he is as conscienceless as Tamerlane, who built a mountain of skulls as a monument to himself. He is cold, calculating, and if opposed, vindictive. On occasion he is absolutely without heart: compassion, mercy or generosity are not then in his make-up ☙ ☙

The best lawyers procurable are paid princely sums to study for him the penal code, and legislatures have

even revised it for his benefit. Eviction, destruction, suicide and insanity have even trod in his train. A picture of him makes you think of that dark and gloomy canvas where Cæsar, Alexander and Napoleon ride slowly side by side through a sea of stiffened corpses. Bribery, coercion, violence and even murder have been this man's weapons. He is the richest man in America. And yet, as I said in the beginning, all this represents only one side of his nature: he reads his chapter in the Bible each evening by his family fireside, and tenderly kisses his grandchildren good-night. ¶ The individual who imagines that embezzlers are all riotous in nature, and by habit are spendthrifts, does not know humanity. The embezzler is one man; the model citizen another, and yet both souls reside in the one body.

Nero had a passion for pet pigeons, and the birds used to come at his call, perch on his shoulder and take dainty crumbs from his lips.

The natures of some men are divided up into water-tight compartments. Sir Isaac Newton kept his religion in one compartment, and his science in another—they never got together.

Voltaire has said, " When Sir Isaac Newton discovered the Law of Gravitation he excited the envy of the learned men of the world; but they more than got even with him when he wrote a book on the prophecies of the Bible."

# SIR ISAAC NEWTON

WHEN Newton was only twenty-seven years old he was elected the Lucasian Professor of Mathematics at Trinity, an office that carried with it a goodly salary and also very much honor. Never before had so young a man held this chair.

Newton was a pioneer in announcing the physical properties of light.

Every village photographer now fully understands this, but when Newton first proclaimed it he created a whirlwind of disapproval.

When a man at that time put forth an unusual thought, it was regarded as a challenge. Teachers and professors all over Great Britain, and also in Germany and France, at once set about to show the fallacy of Newton's conclusions.

Newton had issued a pamphlet with diagrams showing how to study light, and the apparatus was so simple and cheap that the "Newton experiments" were tried everywhere in schoolrooms.

People always combat a new idea when first presented, and so Newton found himself overwhelmed with correspondence

Cheap arguments were fired into Cambridge in volleys. These were backed up by quibbling men—Pro Bono Publico, Veritas and Old Subscriber—men incapable of following Newton's scientific mind. In his great good-nature and patience Newton replied to his oppo-

nents at length. ¶ His explanations were construed into proof that he was not sure of his ground. One man challenged him to debate the matter publicly, and we hear of his going up to London, king that he was, to argue with a commoner.

Such terms as "falsifier," "upstart," "pretender," were freely used, and poor Newton for a time was almost in despair.

He had thought that the world was anxious for truth! Some of his fellow-professors now touched their foreheads and shook their heads ominously as he passed. He had gone so far beyond them that the cries of "whoa!" were unnoticed.

It is here worth noting that the universal fame of Sir Isaac Newton was brought about by his rancorous enemies, and not by his loving friends. Gentle, honest, simple and direct as was his nature, he experienced notoriety before he knew fame.

To the world at large he was a "wizard" and a "juggler" before he was acknowledged a teacher of truth —a man of science.

When the dust of conflict concerning Newton's announcement of the qualities of light had somewhat subsided, he turned to his former discovery, the Law of Gravitation, and bent his mighty mind upon it. The influence of the moon upon the Earth, the tilt of the Earth, the flattening of the poles, the recurring tides, the size, weight and distance of the planets, now

occupied Newton's attention. And to study these phenomena properly, he had to construct special and peculiar apparatus.

In Sixteen Hundred Eighty-seven the results of his discoveries were brought together in one great book, the " Principia." Newton was forty-five years old then.

¶ He was still the Cambridge professor, but was well known in political circles in London on account of having been sent there at various times to represent the University in a legal way.

His diplomatic success led to his being elected a member of Parliament. Among other great men whom he met in London was Samuel Pepys, who kept a diary and therein recorded various important nothings about " Mr. Isaac Newton of Cambridge—a schoolteacher of degree, with a great dignity of manner and pleasing Countenance." It seems Newton thought so well of Pepys that he wrote him several letters, from which Samuel gives us quotations. Pepys really claimed the honor of introducing Newton into good society

Among others with whom Newton made friends in Parliament was Mr. Montague, who shortly afterward became Secretary of the Exchequer. Montague made his friend Newton a Warden of the Mint, with pay about double that which he had received while at Cambridge

In this public work Newton brought such talent and diligence to bear that in Sixteen Hundred Ninety-

seven he was made Master of the Mint, at a salary of fifteen hundred pounds a year—a princely sum in those days

There is no doubt that the fact that Newton was a devout Churchman and an upholder of the Established Order was a great, although perhaps unconscious, diplomatic move.

His delightful personality—gracious, suave, dignified and silent—won for him admiration wherever he would go, In argument his fine reserve and excellent temper were most convincing. Had he turned his attention to the law he would have become Chief Justice of England.

¶ In Seventeen Hundred Three he was elected President of the Royal Society, an office he held continuously for twenty-five years, and which tenure was only terminated by his death.

In Seventeen Hundred Five the Queen visited Cambridge, and there with much pageantry bestowed the honor of Knighthood which changed Professor Newton into Sir Isaac Newton.

But the man himself was still the simple, modest gentleman. The title did not spoil him—he was a noble man from boyhood.

His duties as Master of the Mint did not interfere with his studies and scientific investigations. He revised and rewrote his " Principia," and in Seventeen Hundred Thirteen the new edition was issued. One copy was most sumptuously bound, and Sir Isaac, who was a

special favorite at Court, presented it in person to the Queen. Those who are interested in such things may, by applying to the Curator of the British Museum, see and turn the leaves of this book, reading the gracious inscription of the author, while a solemn man in brass buttons stands behind.

Newton died March Twentieth, Seventeen Hundred Twenty-seven, at the age of eighty-five, and was buried in Westminster Abbey.

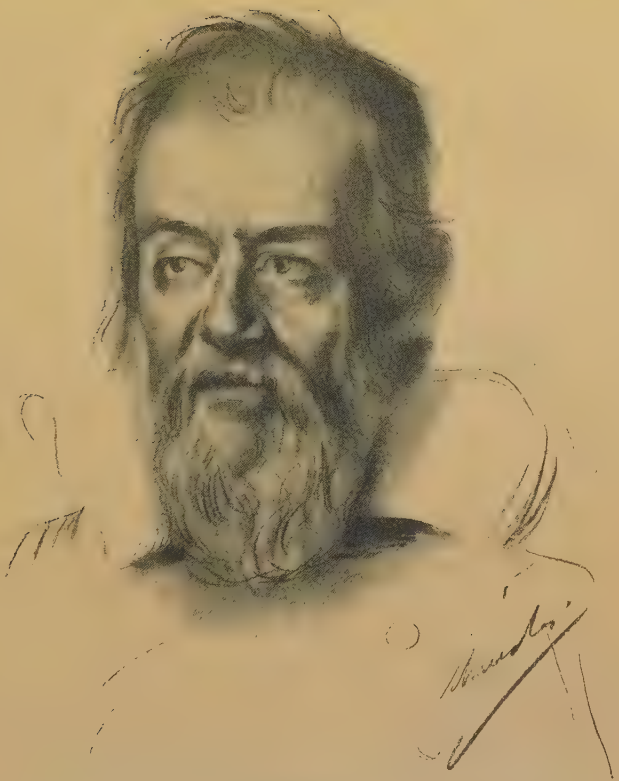
The verdict of humanity concerning Sir Isaac Newton has been summed up for us thus by Laplace: "His work was pre-eminent above all other products of the human intellect."

# GALILEO

I am inclined to believe that the intention of the Sacred Scriptures is to give to mankind the information necessary for their salvation.

But I do not hold it necessary to believe that the same God who has endowed us with senses, with speech, with intellect, intended that we should neglect the use of these, and seek by other means for knowledge which these are sufficient to procure for us; especially in a science like astronomy, of which so little notice is taken by the Scriptures that none of the planets, except the sun and moon and once or twice only Venus, by the name of Lucifer, are so much as named at all. ¶ This therefore being granted, methinks that in the discussion of natural problems we ought not to begin at the authority of texts of Scriptures but at sensible experiments and necessary demonstrations.

—*Galileo*



GALILEO

# GALILEO

ITH the history of Galileo and Copernicus, there is connected a man of such stern and withal striking individuality that the story of the rise and evolution of astronomy can not be told and this man's name left out. Giordano Bruno was born in Fifteen Hundred Forty-eight. His parents were obscure people, and his childhood and early education are enveloped in mystery. Occasional passages in his writings refer to his sympathy for outcast children, and he quotes the saying of Jesus, " Suffer little children to come unto me, and forbid them not, for of such is the Kingdom of Heaven." He then refers to himself as having been a waif and robbed of the love that was his due, " the lawful, legal heritage of every child, sent without its consent into a world of struggle and strife, where only love makes existence possible."

Evidently, the early life of Bruno was a symbol and shadow of what Fate held in store for him.

The first authentic knowledge we have of Bruno was when he was twenty-two years old. He was then a Dominican monk, and he is brought to our attention because he distinguished himself by incurring the displeasure of his superiors. His particular offense

was that he had declared, "The infallibility of the Pope is only in matters spiritual, and does not apply to the science of material things."

Strangely enough, these words of Bruno are almost identical with words recently expressed by Cardinal Satolli

The difference in their reception is owing to a mere matter of a few hundred years. Truth is a question of time and place. Bruno was banished for his temerity, and Satolli wears the red hat. Verily, yesterday's heresy is today's orthodoxy.

# GALILEO

THE attitude of the Church toward the teachings of Copernicus, after the death of the man, was one of patronizing pity.

Instead of putting his great book, "Revolutions of the Heavenly Bodies," on the "Index," the wiser plan was adopted of paying no attention to it. Occasionally, however, the subject was broached by some incautious novitiate, and then the custom was to treat the Copernican Theory as a mere hypothesis, and its author as a mental defective.

Bruno would not have it so. To him it was a very important matter whether the sun revolved around the earth as the priests taught, or the earth revolved around the sun as set forth in the work of Copernicus. He came to the conclusion that Copernicus was right, and said so.

It was ordered that he should cease lecturing on the subject of astronomy and apply himself to spiritual matters. He argued that he should be allowed to think and speak what he pleased about the stars, since the whole matter was one of opinion, and even the Pope did not know, positively, the final facts of astronomy, and if the Copernican Theory was a hypothesis, so also was the Ptolemaic Theory held by the Church. ¶ It will be seen that Copernicus and Bruno were very different in temperament: one was gentle, diplomatic, cautious; the other was headstrong, firm and full of argument. ¶ Bruno was given his choice: to cease the

study of astronomy or to lay aside the Dominican frock. The hardihood of the young man was seen in that he unfrocked himself, thinking that once outside of the order he was not responsible to a superior and could teach what he pleased, so long as it was not "heresy."

Heresy is treason to the Church, but Bruno could not see how spiritual dogma could cover the facts of Physical Science, since new facts were constantly being discovered, and the material universe could only be understood by being studied. He was too innocent to comprehend that a vast majority of the people believed that popes, cardinals and priests knew everything, and that when any branch of knowledge was questioned it placed the priests in doubt. Certainly the Church has not opposed Science—she has only opposed heresy. But the curious fact is that advancing Science has usually been to the Church heretical. When Bruno opposed anything that the priests taught, he opposed the Church. He was warned to leave Rome —his life was in danger. He fled to Geneva, the home of Calvin.

Here he thought, surely, he could speak and write as he chose. But alas! Protestantism cared even less about Science than did the monks, and "heresy" to John Calvin was quite as serious a matter as it was to Calvin's competitor, the Pope of Rome.

The Protestants of Geneva gave Bruno scant attention;

they had never heard of Copernicus, and the movements of the stars were as nothing to them, since the world was soon to come to an end.

The learned men were even then making mathematical calculations, based on the prophecies of the Old Testament, as to how soon the general destruction would take place.

Bruno sought to argue them out of their childishness, with the result that he got himself marked as an infidel and a dangerous man.

From Geneva he went to Lyons, then to Paris, where his personality made itself felt, and he was given a hearing at the University. Here he remained for several years, when he went to England, arriving there in Fifteen Hundred Eighty-four, the same year that a rustic by the name of William Shakespeare, from Stratford, reached London. Whether they ever met is doubtful

Bruno spoke five languages, and his polite accomplishments afforded him an immediate entry into the best circles of society. He was entertained at the home of Sir Philip Sidney, and afterward carried on an extensive correspondence with this prince of gentlemen. Greville presented Bruno to Queen Elizabeth, who invited him to lecture at the Court on his favorite theme.

This he did, and it is quite probable that the noble lords and ladies left " calls " so they could be awakened when the lecture was over and congratulate the speaker

of the evening on his effort. ¶ At Oxford there were disputations where Bruno's faultless Latin impressed the pedants much more than did his argument, so they offered him a position as Professor of Languages, but this he smilingly declined, excusing himself on the grounds that he had important business on the Continent: and he had. Already they were collecting fagots for his benefit.

He returned to Paris and began his lecturing on Science. His arguments had convinced one person at least, and that was himself, that as the Church knew nothing of Physical Science, why, possibly it stood in a like position regarding spiritual truth. That is to say, the so-called " sacred truths " were mere assumptions piled up to satisfy the people, and the ignorance and superstition of the many marked high water for the teaching of the priests. The business of the Church was to satisfy the people, and not enlighten them, for if the people became enlightened enough they would see that they did not need the Church, and then where were the honors and the riches and the red hats!

Bruno cleared his mind of its cobwebs by expression, just as we all do—that is what expression is for.

The people really dictate to the priests what they shall teach; moreover, the people absolutely refuse to listen to anything in which they do not believe, and decline to pay for preaching that is not done to their own dictation. The business, then, of the Church is to study

carefully the ignorance of the people and conform to it. On this one thing does its stability depend. Therefore it must, as a matter of self-preservation, suppress any chance intellect that is ahead of its time, lest this man honeycomb the whole structure of churchly dogma. ¶ Bruno said that, just as the world seemed to stand still and the stars move around us, so did the Church seem to most people a fixed fact. But exactly the opposite was true; the Church moves as the people move, and unless men outside of the Church educate the people, or the people educate themselves, they will forever remain in darkness.

Bruno offered to debate the question publicly with the Bishop of Paris. That worthy was no match for Bruno in point of oratory, but when we can not answer a man's reasons, all is not lost, for we can at least call him vile names, and this is often quite as effectual as logic ☙ ☙

The Bishop launched a fusillade of theological lyddite at Bruno, declaring that any Churchman who would so much as hold converse with such a wretch was disgraced forever, and that the propositions Bruno wished to argue were unthinkable to a self-respecting man. He declared that it was only the mercy of God that kept the lightning from striking Bruno dead as he wrote his heresies.

Matters were getting strained, and the authorities, fearing insurrection, acted upon the advice of the good

Bishop and expelled Bruno from France. He went to Wittenberg, in his innocence, intending to tack on the church-door there his theses. But Wittenberg had no use for Bruno—he believed too much, or too little, Luther could not tell which.

The University of Zurich now offered to let the exile come there and teach what he wished. Thither he journeyed and there his restless mind seemed for the first time to find a home. His writings were slowly making head, and around him there clustered a goodly group of students who believed in him and loved him.

In the midst of this oasis in a troubled life, word came from some of the old-time friends he had known in Rome. They were now in Venice, and wished to have him come there and lecture. Bruno thought that his little leaven was leavening the whole lump—he was not without ambition—he was flattered by the invitation. He accepted it and went to Venice.

It was simply a ruse to get the man within striking distance. Very soon after his arrival in Venice he was arrested by agents of the Inquisition and secretly taken to Rome. He was lodged in a dungeon of the Castle Saint Angelo. Just what his experience was there we can not say—the horrors of it all are not ours, for no friend of Bruno's was allowed to approach, and what he there wrote was destroyed.

We do know, however, that he was asked to recant, and we know he refused. We also know that he repeated

his heresies and hurled back into the teeth of his accusers the invective they heaped upon him.

Bribery, persuasion, threat and torture were tried in turn, but all in vain, for Bruno would not swerve. Unlike Savonarola his quivering flesh could not wring from his heart an apology.

He scorned the rack and thumbscrew, declaring they could not reach his soul. He knew that death would be the end; he prayed for it, and even thought to hasten it by an aggravating manner and harshness of speech toward his captors, seemingly quite unnecessary.

For seven long years he was in prison. He was burned alive on the Seventh of February, Sixteen Hundred, aged fifty-two.

When bound to the stake he turned his face from the crucifix that was held before him, and sought to kiss the fagots. His ashes were thrown to the four winds. Thus perished Bruno.

# GALILEO

IN the year Fifteen Hundred Sixty-four, Galileo Galilei was born; consequently, he was thirty-six years old when Bruno was executed. He had known Bruno, had attended many of his lectures, and had followed his career with interest; and while he agreed with him concerning the Copernican theory of the earth's revolution, he took exceptions to Bruno's arbitrary ways of presenting the matter, and also to his scathing criticisms of theology. At this time Galileo could not see that the extravagant words of Bruno were largely forced from him by the violence of the opposition he had encountered. Galileo fully believed that Bruno had been put to death for treason to the Church, and not on account of his astronomical teachings ❧ ❧

These men had come up from totally different stations in life. Bruno was a man of the people—a self-made man—who bore upon his person the marks of the hammer. Galileo was of noble blood, and traced an ancestry to a Gonfalonier of Florence. From early infancy he had enjoyed association with polite persons, and had sat on the knees of greatness.

When eighteen he was graduated from the University of Pisa; and at that early age his family and friends were comparing him, not without reason, to a Genius who had come out of Tuscany some years before, Leonardo da Vinci.

Parents either exaggerate the talents of their children

or else belittle them. The woman who bore George Gordon called him " that lame brat "; but we call him " The Poet Byron."

Benjamin Franklin ran away from home, and his family thought themselves disgraced by his printed utterances. George Washington's mother, after being told that her son had been made Commander-in-Chief, laughed knowingly and said, " They don't know him as well as I do!" Voltaire's father posted his son as irresponsible, tied up a legacy so " the scapegrace could not waste it," invested good money in daily prayers to be said for the scapegrace's salvation, and then died of a broken heart, just as play-actors do on the stage, only this man died sure enough. Alfred Tennyson at thirteen wrote a poem addressed to his grandfather; the old gentleman gave him a guinea for it, and then wrote these words: " This is the first and last penny you will ever receive for writing poetry." The father of Shelley misquoted Job, and said, " Oh, to be brought down to the grave in grief through the follies of an ungrateful child!" And Labouchere says that one of the four brothers of Shakespeare used to explain that he was n't the play-actor who wrote " Hamlet " and " Othello," lest, mayhap, his name should be smirched.

¶ Galileo's mother had that beautiful dream which I believe all good mothers have: that her son might be the savior of the world. As he grew to manhood, her faith in him did not relax.

In childhood Galileo showed great skill in invention. He made curious toys with cogs and wheels and eccentrics; whittled out violins, and transformed simple reeds into lutes, upon which he played music of his own composition. In fact, so great was his skill in music that at twenty they wished to make him official organist and choirmaster of the Cathedral. His personal taste, however, ran more to painting; for some months he worked at his canvases with an ardor too great to last long. If ever a man was touched by the Spirit of the Renaissance, it was surely young Galileo. The Archbishop of Pisa said, " Upon him has fallen the mantle of Michelangelo."

He gave lectures on Art, and taught Painting by actual example. One of his pupils, and a great artist, Lodovico Cigoli, always maintained that it was to the inspiration and counsel of Galileo that he owed his success.

There are really only two things to see at Pisa: one is the Leaning Tower, from which Galileo with his line and plummet made some of his most interesting experiments; and the other is the Cathedral where the visitor beholds the great bronze lamp that is suspended from the vaulted ceiling. When he was about twenty-one, sitting in the silence of this church (which the passing years have only made more beautiful), he noticed that there was a slight swinging motion to this lamp—it was never still. Galileo set to work timing and measuring these oscillations, and he found that they were always

done in exact measure and in perfect rhythm. This led, some years later, to perfecting an astronomical clock for measuring movements of the stars. And from this was originated the pendulum-clock, where before we had depended on sundials.

The endeavor of Galileo's parents had been to keep him ignorant of mathematics and practical life, that he might blossom forth as a saint who would sing and play and make pictures like those of Leonardo, and carve statues like Michelangelo, only better.

But parents plan, and Fate disposes.

In Fifteen Hundred Eighty-three, Ostilio Ricci, the famous mathematician, chanced to be in Pisa, on his way from Rome to Milan, and gave a lecture at the Court, on Geometry.

Galileo was not interested in the theme, but he was in the speaker, and so he attended the lecture.

This action proved one of the pivotal points in his life.

¶ "Whether other people really teach us anything, is a question," says Stanley Hall; "but they do sometimes give us impulses, and make us find out for ourselves." ☙ ☙

Ricci made Galileo find out for himself.

He turned to Archimedes from Plato. Geometry became a passion, and a very wise man has told us that we never accomplish anything, either good or bad, without passion. Passion means one hundred pounds of steam on the boiler, with love sitting on the safety-valve,

when the blow-off is set for fifty. ¶ It surely is risky business, I will admit; accidents will occur occasionally and explosions sometimes happen, but everything is risky, even life, since few get out of it alive.

And so, to drop back to the original proposition, nothing great and sublime is ever done without passion.

Galileo had his mechanical whooping-cough, musical mumps, artistic measles, and now the hectic flush of mathematics burned on his cheeks. He talked and dreamed mathematics.

Euclid was in the saddle.

Ricci became interested in the talented young scholar and remained longer at Pisa than he had intended, that they might sit up all night and surprise the rising sun, discussing beauties of dimensions and the wonders of dynamics.

Together they went to Florence, where Ricci introduced his pupil as a pedagogic sample of the goods, just as Booker Washington usually takes with him on his travels a few ebony homo bricks as his specimens from Tuskegee ✂ ✂

The beauty and the grace of Galileo's speech and presence put the abstract Ricci in the shadow. The right man can make anything interesting, just as Dean Swift could write an entrancing essay with the broomstick as a central theme. The man 's the thing, Hamlet to the contrary, notwithstanding.

Galileo knew the Florentine heart, and so he gave

lectures on a Florentine: one Dante, who loved a girl named Beatrice.

The young Pisan drew diagrams of Dante's Inferno—and surely it was nobody's else. He gave its size, height, weight, and told how to reach it.

He gave lectures on the Hydrostatic Balance and the Centers of Gravity, and then published them as serials.

¶ The Florentines crowned him with bay and enthusiastically proclaimed him, " The Modern Archimedes."

PISA now put forth efforts to have her gifted son come home. There was always rivalry between Pisa and Florence. Pisa could not afford to supply Florence her men of genius—let her depend upon production from home, or go without

Galileo became Professor of Mathematics at the University of Pisa, a life position, or at least one he could hold during good behavior.

One of the time-honored dictums of the day was that falling bodies fell with a velocity proportioned to their weight. The question was first thrashed out in the classroom; and after Galileo had slyly gotten all of these scientific wiseacres to commit themselves, he invited them, with their students, to the Leaning Tower. ¶ Then he proved by ocular demonstrations that they were positively wrong.

It is very beautiful to teach Truth, but error should not be corrected with too much eclat. If the love of Truth, alone, was the guiding impulse of Galileo, he might have secretly explained his theory to one of the wiseacres, and this wiseacre could have casually demonstrated it, so all the rest could have said, "That is what we always knew and taught."

Instead of this, Galileo compelled the entire faculty to back water and dine on fricasseed crow.

They got even by calling him "a scientifico bastardino," and at his next lecture he was roundly hissed. Soon

after he was bluntly informed that his office was to teach the young, and not to undo the old.

And that is the way the troubles of Galileo began.

He might then have apologized, and slipped back into peace and obscurity and later been tucked in by kind oblivion. But he had tasted blood, and the rabies of setting straight the scientific world, for its own good, was upon him.

That he was wrong in the correction of his elders, he would not for a moment admit; and he was even guilty of saying, "Antiquity can not sanctify that which is wrong in reason and false in principle." Soon after he committed another forepaugh by showing that a wonderful boat invented by Giovanni de Medici for the purpose of fighting hostile ships, would not work, since there were no men on board to guide it, and its automatic steering apparatus would as likely run its nose into land, as into the hull of the enemy.

He also decorated his argument with a few subtle touches as to the beauty of fighting battles without going to war and risking life and limb.

Men who are not kind to the faults of royalty can hope for small favor in a monarchy, though the monarchy be a republic. Galileo was cut off the Standard Oil payroll, and forced to apply to a teachers' agency, that he might find employment.

He did not wait long; the rival University of Padua tendered him a position on a silver platter; and the

Paduans made much dole about how unfortunate it was that men could not teach Truth in Italy, save at Padua—alas! The Governing Board of Padua made a great stroke in securing Galileo, and Pisa fell back on her Leaning Tower as her chief attraction.

From a position of mediocrity, the University of Padua gradually rose to one of worldwide celebrity. Galileo remained at Padua from Fifteen Hundred Ninety-two to Sixteen Hundred Ten, which years are famous not alone through the wonderful inventions of Galileo, but because in that same interval of time, at least thirty of Shakespeare's thirty-seven plays were written. Surely, God was smiling on the planet Earth!

Galileo's salary was raised every year, starting at two hundred florins, until it reached over one thousand florins, not to mention the numerous gifts from grateful pupils, old and young. Students came to Padua from all over the world to hear Galileo's lectures.

Starting with only a common classroom, the audience increased so fast that a special auditorium was required that would seat two thousand persons. It was during this time that Galileo invented the proportional compasses, an instrument now in use everywhere, without the slightest change having been made in it.

He also invented the thermometer; but greatest, best and most wonderful of all, he produced an instrument through which he could view the stars, and see them much magnified. With this instrument, he saw heavenly

bodies that had never been seen before; he beheld that Jupiter had satellites which moved in orbits, and that Venus revolved, showing different sides at different times, thus proving that which Copernicus declared was true, but which, for lack of apparatus, he could not prove.

Galileo Galilei was getting to be more than a professor of mathematics—he was becoming a power in the world. ¶ The lever of his mighty mind was indeed finding a fulcrum

# GALILEO

THE year Sixteen Hundred Nine is forever fixed in history, through the fact that in that year Galileo invented the telescope. ¶ Every good thing is an evolution. " Specilla," or helps to read, had been made, and sold privately and mysteriously, as early as the year Fourteen Hundred. These first magnifying-glasses were associated with magic, or wonder-working; the words " magnify " and " magic " having a common source and a similar meaning. Magicians wore big square glasses, and by their aid, some of them claimed to see things at a great distance; and also to perceive things stolen, hidden or lost. Occasionally, the magician would persuade his customer to try on the glasses, and then even common men could see for themselves that there was something in the scheme—goodness me! The use of spectacles was at first confined entirely to these wonder-workers—or men who magnified things forever. During the Fifteenth Century, public readers and occasionally priests wore spectacles. To read was a miracle to most people, and a book was a mysterious and sacred thing—or else a diabolical thing. The populace would watch the man put on his " specillum," and the idea was everywhere abroad that the magic glasses gave an ability to read; and that anybody who was inspired by angels, or devils, who could get hold of spectacles, could at once read from a book. ¶ We hear of one magician who, about the year Fifteen

Hundred, made a box with a glass cover that magnified the contents. This great man would catch a flea and show it to the people. Then he would place the flea in the box and show it to them, and they would see that it had grown enormously in an instant. The man could make it big or little, by just taking off and putting on the cover of the box!

This individual worked wonders for a consideration, but Fate overtook him and he was smothered under a feather bed for having too much wizard in his cosmos. A wizard, be it known, is a male witch, and the Bible says, " Thou shalt not suffer a witch to live," although it does not say anything about wizards.

But please note this: the wizard who had that magic box and flea had really the first microscope.

Galileo bought a pair of " magic glasses," or spectacles, about the year Sixteen Hundred Seven; and his action, in so doing, was freely criticized.

On a visit to Venice, where glass had been manufactured since long before the Flood, Galileo was looking through one of the glass-factories, just as visitors do now, and one of the workmen showed him a peculiar piece of glass which magnified the hairs on the back of his hand many times.

In a very few days after this, Galileo heard that a Dutch spectacle-maker had placed certain queer-shaped pieces of glass in a tube, and offered to sell this tube to the Government, so by its use, soldiers

could see the movements of an enemy many miles away ☙ ☙

That night Galileo did not close his eyes in sleep. He thought out a plan by which he could place pieces of glass in a tube, and bring the stars close to the earth. By daylight the whole plan was clear in his mind, and he hastened to the shop of the glassmakers.

There, two lenses were made, one plano-convex, and the other plano-concave, and these were placed in a tube made of sheet copper. It was tested on distant objects; and behold! they were magnified by three. Would this tube show the stars magnified? Galileo knew of no reason why it should not, but he paced his room in hot impatience, waiting for the night to come with its twinkling wonders, that he might verify his convictions. When the first yellow star appeared in the West, Galileo turned his tube upon it, and behold! instead of twinkling points of light, he saw a round mass—a world—moving through space, and not a scintillating object with five points. The twinkling spikes, or points, were merely an optical illusion of the unaided senses.

Galileo made no secret of his invention. It was called "Galileo's Tube," but some of the priests called it Galileo's "Magic Tube."

Yet it marked an era in the scientific world. Galileo endeavored constantly to improve his instrument; and from a threefold magnifying power, he finally

made one that magnified thirty-two times. ¶ Galileo made hundreds of telescopes, and sold them at moderate prices to any one who would buy. He explained minutely the construction of the instrument, showing clearly how it was made in accordance with the natural laws of optics. His desire was to dissipate the superstition that there was something diabolical or supernatural about the "Magic Tube"—that, in fact, it was not magic, and the operator had no peculiar powers; you had simply to comply with the laws of Nature, and any one could see for himself.

It is hard for us, at this day, to understand the opposition that sprang up against the telescope. We must remember that at this time belief in witchcraft, fairies, sprites, ghosts, hobgoblins, magic and supernatural powers was common. Men who believe in miracles make rather poor scientists.

There were books about "Magic," written by so-called scientific men, whose standing in the world was quite as high as that of Galileo.

In Sixteen Hundred Ten, Galileo published his book entitled, "Sidera Medicea," wherein he described the wonders that could be seen in the heavens by the aid of the telescope. Among other things, he said the Milky Way was not a great streak of light, but was composed of a multitude of stars; and he made a map of the stars that could be seen only with the aid of the telescope. ¶ There resided in Venice at this time a scientific man

by the name of Porta, who was much more popular than Galileo. He was a priest, whose piety and learning was unimpeached.

The year after Galileo issued his book, Porta put out a work much more pretentious, called " Natural Magic." In this book Porta does not claim that magicians all have supernatural powers; but he goes on to prove how they deceive the world by the use of their peculiar apparatus, and intimates that they sometimes sell their souls to the Devil, and then are positively dangerous. He dives deep into science, history and his own imagination to prove things.

The man was no fool—he constructed a kaleidoscope that showed an absolute, geometrical symmetry, where in fact there was only confusion. He showed how, by the use of mirrors, things could be made big, small, tall, short, wide, crooked or distorted. He told of how magicians, by the use of Galileo's Tube, could show seven stars where there was only one; and he even made such a tube of his own and called the priests together to look through it. He painted stars on the glass, and had men look at the heavens. He even stuck a louse on the lens and located the beast in the heavens, for the benefit of a doubting Cardinal. It was all a joke, but at the time no sober, sincere man of Science could argue him down. He owned " bum " telescopes that proved all kinds of things, to the great amusement of the enemies of Galileo. The intent of Porta was to

expose the frauds and fallacies of Galileo. Porta also claimed that he had seen telescopes by which you could look over a hill and around a corner, but he did not recommend them, since by their use things are often perceived that were not there. And so we see why the priests positively refused to look through Galileo's Tube, or to believe anything he said. Porta, and a few others like him, showed a deal more than Galileo could and offered to locate stars anywhere on order. Galileo had much offended these priests by his statements that the Bible did not contain the final facts of Science, and now they were getting even with a vengeance. It was all very much like the theological guffaw that swept over Christendom when Darwin issued his "Origin of Species," and Talmage and Spurgeon set their congregations in a roar by gently sarcastic references to monkey ancestry.

AMID the general popping of theological small-arms, Galileo moved steadily forward. If he had many enemies he surely had a few friends. As he once had proved more than Pisa could digest, so now he was bringing to the surface of things more truth than Padua could assimilate ☙ Venice too was getting uncomfortable. Even the Doge said, in reply to an enthusiastic admirer of Galileo, "Your master is not famous: he is merely notorious." ¶ It was discovered that Galileo had been living with a woman by the name of Marina Gamba, at Venice, even while he held the professorship at Padua, and that they had a son, Vincenzo Gamba, and two daughters. One of the enemy drew a map of the heavens, showing Galileo as the sun, Marina Gamba as the moon, and around them circulated numerous little satellites, which were supposed to be their children. The picture had so great a vogue that the Doge issued an order that all copies of it be destroyed.

Of Marina Gamba we know very little; but the fact that she made entries in Galileo's journal and kept his accounts proves that she was a person of considerable intelligence; and this, too, was at a time when semi-oriental ideas prevailed and education was supposedly beyond the feminine grasp.

Galileo did not marry, for the reason that he was practically a priest, a teacher in a religious school, living with and looking after the pupils; and the custom

then was that whoever was engaged in such an occupation should not wed.

The stormy opposition to Galileo was not without its advantages. We are advertised no less by our rabid enemies than by our loving friends. Cosimo the Second, Grand Duke of Tuscany, had intimated that Florence would give the great astronomer a welcome. Galileo moved to Florence under the protection of Cosimo, intending to devote all his time to Science.

In giving up schoolteaching and popular lecturing, Galileo really made a virtue of necessity. No orthodox lyceum course would tolerate him; he was neither an impersonator nor an entertainer; the stereopticon and the melodramatic were out of his line, and his passion for truth made him impossible to the many. ¶ He was treading the path of Bruno: the accusations, the taunts and jeers, the denials and denunciations, were urging him on to an unseemly earnestness.

Father Clavius said that Galileo never saw the satellites of Jupiter until he had made an instrument that would create them; and if God had intended that men should see strange things in the heavens, He would have supplied them sufficient eyesight. The telescope was really a devil's instrument.

Still another man declared that if the earth moved, acorns falling from a high tree would all fall behind the tree and not directly under it.

Father Brini said that if the earth revolved, we would

all fall off of it into the air when it was upside down; moreover, its whirling through space would create a wind that would sweep it bald.

Father Caccini preached a sermon from the text, "Ye men of Galilee, why stand ye gazing up into heaven?" Only he changed the word "Galilee" to "Galileo," claiming it was the same thing, only different, and as reward for his wit he was made a bishop.

¶ Cardinal Bellarmine, a man of great energy, earnest, zealous, sincere, learned—the Doctor Buckley of his day—showed how that: "if the Copernican Theory should prevail, it would be the absolute undoing of the Bible, and the destruction of the Church, rendering the death of Christ futile. If the earth is only one of many planets, and not the center of the universe, and the other planets are inhabited, the whole plan of salvation fails, since the inhabitants of the other spheres are without the Bible, and Christ did not die for them." This was the argument of Father Lecazre, and many others who took their cue from him.

Galileo was denounced as "atheist" and "infidel" —epithets that do not frighten us much now, since they have been applied to most of the really great and good men who have ever lived. But then such words set fire to masses of inflammable prejudices, and there were conflagrations of wrath and hate against which it was vain to argue.

The Archbishop of Pisa especially felt it incumbent

upon him "to bring Galileo to justice." ¶ Galileo was born at Pisa, educated there, taught in the University; and now he had disgraced the place and brought it into disrepute. ¶ Galileo was still in communication with teachers at Pisa, and the Archbishop made it his business to have letters written to Galileo asking certain specific questions. One man, Castelli, declined to be used for the purpose of entrapping Galileo, but others there were who loaned themselves to the plan.

In Sixteen Hundred Sixteen, Galileo received a formal summons from Pope Paul the Fifth to come to Rome and purge himself of heresies that he had expressed in letters which were then in the hands of the Inquisition

Galileo appealed to his friends at Florence, but they were powerless. When the Pope issued an order, it could not be waived. The greatest thinker of his time journeyed to Rome and faced the greatest theologian of his day, Cardinal Bellarmine.

The Cardinal firmly and clearly showed Galileo the error of his way. Galileo offered to prove for the Cardinal by astronomical observations that the Copernican Theory was true. Cardinal Bellarmine said that there was only one truth and that was spiritual truth. That the Bible was true, or it was not. If not, then was religion a fallacy and our hope of Heaven a delusion. ¶ Galileo contended that the death of Christ had

nothing to do with the truth, so Science and these things should not be shuffled and confused. ¶ This attitude of mind greatly shocked the Inquisitors, and they made haste to inform the Pope, who at once issued an order that the astronomer should be placed in a dungeon until he saw fit to disavow that the sun was the center of the universe, and the earth moves.

A sort of compromise, it seems, was here effected by Galileo's promise not to further teach that the earth revolves ✍ ✍

He was kept at Rome under strict surveillance for some months, but was finally allowed to return to Florence, and cautioned that he must cease all public teaching, speaking and writing on the subject of astronomy.

On March Fifth, Sixteen Hundred Sixteen, the consulting theologians of the Holy Office reiterated that the propositions of Galileo, that the sun is the center of the universe, and that the earth has a rotary motion, were " absurd in philosophy, heretical, and also contrary to Scripture."

The works of Copernicus were then placed upon the " Index," and Pope Paul issued a special decree, warning all Churchmen to " abjure, shun and forever abstain from giving encouragement, support, succor or friendship to any one who believed or taught that the earth revolves."

The name of Copernicus was not removed from the " Index " until the year Eighteen Hundred Eighteen.

# GALILEO

GALILEO made his way back to Florence, defeated and disappointed. He had not been tortured, except mentally, but he had heard the dungeon-key turned in the big lock and felt the humiliation of being made a captive. The instruments of torture had been shown to him, and he had heard the cries of the condemned.

The cell that Bruno had occupied was his, and he was also taken to the spot where Bruno was burned: the place was there, but where was Bruno!

He realized how utterly impossible it was to teach truth to those who did not desire truth, and the vanity of replying to men for whom a pun answered the purposes of fact.

As he could neither teach nor lecture at Florence, his services to the Court were valueless. He was a disgraced and silenced man.

He retired to a village a few miles from the city, and in secret continued his studies and observations. The Grand Duke supplied him a small pension and suggested that it would be increased if Galileo would give lectures on Poetry and Rhetoric, which were not forbidden themes, and try to make himself either commonplace or amusing.

We can imagine the reply—Galileo had but one theme, the wonders of the heavens above.

SO the years went by, and Galileo, sixty-seven years old, was impoverished and forgotten, yet in his proud heart burned the embers of ambition. He believed in himself; he believed in the sacredness of his one mission. Pope Paul had gone on his long journey, for even infallible popes die. Cardinal Barberini had become Pope Urban the Eighth. Years before, Galileo and Barberini had taught together at Padua, and when Galileo was silenced, a long letter of sympathy had come from his old colleague, and occasionally since they had exchanged friendly letters. Galileo thought that Urban was his friend, and he knew that Urban, in his heart, believed in the theory of Copernicus.

Galileo then emerged from his seclusion and began teaching and speaking in Florence. He also fitted up an observatory and invited the scholars to make use of his telescope.

Father Melchior hereupon put forth a general denunciation, aimed especially at Galileo, without mentioning his name, to this effect: "The opinion of the earth's motion is, of all heresies, the most abominable, the most pernicious, the most scandalous: the immovability of the earth is thrice sacred.

"An argument against the existence of God and the immortality of the soul would be sooner tolerated than the idea that the earth moves."

In reply to this fusillade, in Sixteen Hundred

Thirty-two Galileo put forth his book entitled, "The Dialogue," which was intended to place the ideas of Copernicus in popular form.

Galileo had endeavored to communicate with Urban, but the Pope had chosen to ignore him—to consider him as one dead. Galileo misconstrued the silence, thinking it meant that he could do and say what he wished and that there would be no interference.

A copy of Galileo's book reaching the Pope, his silence was at once broken. The book was condemned and all copies found were ordered to be burned by the hangman in the public streets. But the book had met with a wide sale and many copies had been carried to Germany, England and France, and in these countries the work was reprinted and sent back to Italy. ¶ Urban ordered Galileo to present himself at Rome forthwith. A score of years had passed since Galileo's former visit—he had not forgotten it.

He wrote to the Pope and apologized for having broken the silence imposed upon him by Pope Paul; he offered to go into retirement again; stated that he was old, infirm, without funds, and excused himself from obeying the order to go to Rome. ¶ But excuses and apologies were unavailing.

A preventory order was issued and sent to the Papal Nuncio at Florence.

This was equivalent to an arrest. Galileo must go to Rome and answer for having broken the promises he

had made to the Inquisition. If he would not go willingly, he should go in chains. ¶ Arriving at Rome, he had several audiences with the Pope, who said nothing would answer but a specific recantation ☙ What Barberini had once believed was one thing, and what the Pope must do was another. Galileo should recant in order to keep the people from thinking Pope Urban would allow what his predecessors would not. ¶ The matter had become a public scandal.

Galileo tried to argue the question and asked for time to consider it.

An order was issued that he should be imprisoned. It was done.

Galileo asked for pens and paper that he might prepare his defense. These were refused, and an order of torture was issued. It was not a trial, defense was useless. Again he was asked to recant—the matter was all written out —he had but to sign his name. He refused. He was brought to the torture-chamber.

Legend and fact separate here.

There are denials from Churchmen that Galileo was so much as imprisoned. One writer has even tried to show that Galileo was a guest of the Pope and dined daily at his table. The other side has told us that Galileo was thrust into a dungeon, his eyes put out, and his old broken-down form tortured on the wheel. ¶ Recent careful researches reveal that neither side told the truth. We have official record of the case

written out at the time for the Vatican archives. Galileo was imprisoned and the order of torture issued, but it was never enforced. Perhaps it was not the intention to enforce it: it may have been only a " war measure."

¶ Galileo was alternately taken from dungeon to palace that he might realize which course was best for him to pursue—oppose the Church or uphold it.

Thus we see that there was some truth in the statement that " he dined daily with the Pope."

That the man was subjected to much indignity, all the world now knows. The official records are in the Vatican, and the attempt to conceal them longer is out of the question. Wise Churchmen no longer deny the blunders of the past, but they say with Cardinal Satolli, " The enemies of the Church have ever been o'er-zealous Churchmen."

On bended knees, Galileo, a man of threescore and ten, broken in health, with spirit crushed, repeated after a priest these words: " I, Galileo Galilei, being in my seventieth year, a prisoner, on my knees before your Eminences, the Cardinals of the Holy See, having before mine eyes the Holy Bible, which I touch with my hands and kiss with my lips, do abjure, curse and detest the error and heresy of the movement of the earth."

He also was made to sign the recantation. On arising from his knees, legend declares that he said, " Yet the earth does move! "

It is hardly probable that the words reached his lips, although they may have been in his mind. But we must remember the man's heart was broken, and he was in a mental condition where nothing really mattered. To complete his dishonor, all of his writings were placed on the " Index," and he was made to swear that he would inform the Inquisition of any man whom he should hear or discover supporting the heresy of the motion of the earth. The old man was then released, a prisoner on parole, and allowed to make his way home to Florence, which he did by easy stages, helped along the way by friendly monks who discussed with him all questions but those of astronomy.

Galileo's eldest daughter, a nun, whose home was near his, was so affected by the humiliation of her father that she fell into a nervous decline and died very soon after he reached home.

Between these two there had been a close bond of love and tender sympathy, and her death seemed almost the crowning calamity.

But once back in his village home at Arcetri, Galileo again went to work with his telescope, mapping the heavens

A goodly degree of health and animation came back to him, but his eyesight, so long misused, now failed him and he became blind. Thus John Milton found him in Sixteen Hundred Thirty-eight.

Castelli, his lifelong friend, wrote to another, "The noblest eye that God ever made is darkened: the eye so privileged that it may in truth be said to have seen more wonderful things and made others to see more wonderful things, than were ever seen before." But blindness could not subdue him any more than it could John Milton. He had others look through the telescope and tell him what they saw and then he would foretell what they would see next.

The policy of the Pope was that Galileo should not be disturbed so long as he kept to his village home and taught merely the few scholars or "servants," as they called themselves, who often came to him; but these were to be taught mathematics, not astronomy. That he was even at the last under suspicion is shown that concealed in the mattress of the bed upon which he died were records of his latest discoveries concerning the revolution of the planets. Legal opposition was made as to his right to make a will, the claim being that he was a prisoner of the Inquisition at his death. For the same reason his body was not allowed to be buried in consecrated ground. The Pope overruled the objection and he was buried in an obscure corner of the little cemetery of Saint Croce, the grave unmarked.

¶ So the last few years of Galileo's life were years of comparative peace and quiet. He needed but little, and this little his few faithful, loving friends supplied. His death came painlessly, and his last moments were

sustained by the faith that he would soon be free from the trammels of the flesh—free to visit some of the worlds that his telescope had brought so near to him. ¶ Galileo was born the day that Michelangelo died; the year of his death was the year that Sir Isaac Newton, the discoverer of the law of gravitation, was born.

# COPERNICUS

To know the mighty works of God; to comprehend His wisdom and majesty and power; to appreciate, in degree, the wonderful working of His laws, surely all this must be a pleasing and acceptable mode of worship to the Most High, to whom ignorance can not be more grateful than knowledge.

—*Copernicus*

COPERNICUS

# COPERNICUS

HEN a prominent member of Congress, of slightly convivial turn, went to sleep on the floor of the House of Representatives and suddenly awakening, convulsed the assemblage by demanding in a loud voice, "Where am I at?" he propounded an inquiry that is indisputably a classic.

With the very first glimmering of intelligence, and as far back as history goes, man has always asked that question, also three others:

Where am I?

Who am I?

What am I here for?

Where am I going?

A question implies an answer and so, coeval with the questioner, we find a class of Volunteers springing into being, who have taken upon themselves the business of answering the interrogations.

And as partial payment for answering these questions, the man who answered has exacted a living from the man who asked, also titles, honors, gauds, jewels and obsequies.

Further than this, the Volunteer who answered has declared himself exempt from all useful labor. This

# COPERNICUS

Volunteer is our theologian. ¶Walt Whitman has said:

I think I could turn and live with animals, they are
so placid and self-contained,
I stand and look at them long and long.
They do not sweat and whine about their condition,
They do not lie awake in the dark and weep for their
sins,
They do not make me sick discussing their duty to God,
Not one is dissatisfied, not one is demented with the
mania of owning things,
Not one kneels to another, nor to his kind that lived
thousands of years ago,
Not one is respectable or unhappy over the whole earth.

But we should note this fact: Whitman merely wanted to live with animals—he did not desire to become one. He was n't willing to forfeit knowledge; and a part of that knowledge was that man has some things yet to learn from the patient brute. Much of man's misery has come from his persistent questioning.

The book of Genesis is certainly right when it tells us that man's troubles came from a desire to know. The fruit of the tree of knowledge is bitter, and man's digestive apparatus is ill-conditioned to digest it. But still we are grateful, and good men never forget that it was woman who gave the fruit to man—

men learn nothing alone. In the Garden of Eden, with everything supplied, man was an animal, but when he was turned out and had to work, strive, struggle and suffer, he began to grow.

The Volunteers of the Far East have told us that man's deliverance from the evils of life must come through killing desire; we will reach Nirvana—rest—through nothingness. But within a decade it has been borne in upon a vast number of the thinking men of the world that deliverance from sorrow and discontent was to be had not through ceasing to ask questions, but by asking one question more. The question is this, "What can I do?"

When man went to work, action removed the doubt that theory could not solve.

The rushing winds purify the air; only running water is pure; and the holy man, if there be such, is the one who loses himself in persistent, useful effort. By working for all, we secure the best results for self, and when we truly work for self, we work for all.

In that thoughtful essay by Brooks Adams, "The Law of Civilization and Decay," the author says, "Thought is one of the manifestations of human energy, and among the earlier and simpler phases of thought, two stand conspicuous—Fear and Greed: Fear, which, by stimulating the imagination, creates a belief in an invisible world, and ultimately develops a priesthood."

The priestly class evolves naturally into being everywhere as man awakens and asks questions. "Only the Unknown is terrible," says Victor Hugo. We can cope with the known, and at the worst we can overcome the unknown by accepting it. Verestchagin, the great painter who knew the psychology of war as few have known, and went down to his death gloriously, as he should, on a sinking battleship, once said, "In modern warfare, when man does not see his enemy, the poetry of the battle is gone, and man is rendered by the Unknown into a quaking coward."

But when enveloped in the fog of ignorance every phenomenon of Nature causes man to quake and tremble—he wants to know! Fear prompts him to ask, and Greed—greed for power, place and pelf—answers

To succeed beyond the average is to realize a weakness in humanity and then bank on it. The priest who pacifies is as natural as the fear he seeks to assuage—as natural as man himself.

So first, man is in bondage to his fear, and this bondage he exchanges for bondage to a priest. First, he fears the unknown; second, he fears the priest who has power with the unknown.

Soon the priest becomes a slave to the answers he has conjured forth. He grows to believe what he at first pretended to know. The punishment of every liar is that he eventually believes his lies. The mind

of man becomes tinted and subdued to what he works in, like the dyer's hand.

So we have the formula: Man in bondage to fear. Man in bondage to a priest. The priest in bondage to a creed.

Then the priest and his institution become an integral part and parcel of the State, mixed in all its affairs. The success of the State seems to lie in holding belief intact and stilling all further questions of the people, transferring all doubts to this Volunteer Class which answers for a consideration.

Naturally, the man who does not accept the answers is regarded as an enemy of the State—that is, the enemy of mankind.

To keep this questioner down has been the problem of every religion. And the great problem of progress has been to smuggle the newly-discovered truth past Cerberus, the priest, by preparing a sop that was to him palatable.

From every branch of Science the priest has been routed, save in Sociology alone. Here he has stubbornly made his last stand, and is saving himself alive by slowly accepting the situation and transforming himself into the Promoter of a Social Club.

# COPERNICUS

THE attempt to ascertain the truths of physical science outside of theology was, in the early ages, very seldom ventured. When men wanted to know anything about anything, they asked the priest.

Questions that the priest could not answer he declared were forbidden of man to know; and when men attempted to find out for themselves they were looked upon as heretics.

The early church regarded the earth as a flat surface with four corners. And in proof of their position they quoted Saint Paul, who wanted the gospel carried to the ends of the earth.

In fact, the universe was a house. The upper story was Heaven, the lower story was the Earth, and the cellar was Hell. God, the angels and the "saved" lived in Heaven, man lived on Earth, and the devils and the damned had Hell to themselves.

"And there shall be no night there," and this was proven by the stars, which were regarded as peepholes through which mortals could catch glimpses of the wondrous light of Heaven beyond. Hell was below, as was clearly shown by volcanoes, when the fierce fires occasionally forced themselves up through. Darkness to children is always terrible, and the night is regarded by them as the time of evil.

Later, Churchmen came to believe that the stars were jewels hung in the sky every night by angels whose

business it was to look after them. ¶ The word "firmament" means a solid dome or roof. This firmament, the sky, was supposed to be the floor of Heaven. The firmament had four corners and rested on the mountains, as the eye could plainly see. When God's car was rolled across the floor we heard thunder, and his movements were always accompanied by lightnings, winds, black clouds and rain—all this so He could not be too plainly seen.

Heaven was only a little way off—a few miles at the most. So there were attempts made at times by bad men to reach it. The Greeks had a story about the Aloidæ who piled mountain upon mountain; the Bible story of the Tower of Babel is the same, where the masons called, "More mort," and those below sent up bricks. There is also an ancient Mexican legend of giants who built the Pyramid of Cholula, and they would have been successful in their attempts if fire had not been thrown down upon them from Heaven. In all "Holy Writ" we find accounts of "ascensions," "translations," "annunciations," and mortals caught up into the clouds. Many people had actually seen angels ascending and descending.

"Messengers from on high" and God's secretaries were constantly coming down on delicate errands. Everything that man did was noted and written down. We were watched all the time by unseen beings. The Bible tells of how the Earth was eventually to be

destroyed, and then there would be only Heaven and Hell. God, His Son and the angels were going to come down, and for ages men watched the heavens to see them appear.

All sensitive children, born of orthodox Christian parents, who heard the Bible read aloud, looked fearfully into the sky for " signs and wonders." The Bible tells in several places of devils breaking out of Hell and roaming over the earth. Dante fully believed in this three-story-house idea, and pictures with awful exactness the details, which he gained from the preaching of the priests. Dante was never honored by having his books placed on the " Index." On the contrary, he got his vogue largely through the recommendation of the priests. To them he was a true scientist, for he corroborated their statements.

The Christian Fathers ridiculed the idea of the earth being round, because, if this were so, how could the people on the other side see the Son of Man when He came in the sky? Besides that, if the earth were round and turned on its axis, we would all fall off into space

The idea that there was an ocean above the earth, in the heavens, was brought forward to show the goodness and wisdom of God. Without this there would be no rain and hence no vegetation, and man would soon perish. In Genesis we read that God said, " Let there be a firmament in the midst of the waters, and

let it divide the waters from the waters." And in Psalms, " Praise Him, ye heavens of heavens and ye waters that be above the heavens." Then we hear, " The windows of Heaven were opened." So this thought of the waters above the earth was fully proved, accepted and fixed, and to pray for rain was quite a natural thing.

The English Prayer-Book contained such prayers up to within a very few years ago, and in Eighteen Hundred Eighty-three the Governor of Kansas set apart a day upon which the people were to pray that God would open the windows of Heaven and send them rain. They also prayed to be delivered from grasshoppers, just as in Queen Elizabeth's time the Prayer-Book had this, " From the Turk and the Comet, good Lord deliver us."

¶ In the Sixth Century, Cosmos, one of the Saints, wrote a complete explanation of the phenomena of the heavens. To account for the movement of the sun, he said God had His angels push it across the firmament and put it behind a mountain each night, and the next morning it was brought out on the other side. He met every objection by citations from Job, Genesis, Ezekiel, Ecclesiastes and the New Testament, and wound up with an anathema upon any or all who doubted or questioned in this matter of astronomy.

The whole Christian idea of the Universe was simple, plain and plausible. The child-mind could easily accept it, and when backed up by the Holy Book, written

at God's dictation, word for word, infallible and absolutely true in every part, one does not wonder that progress was practically blocked for fourteen hundred years, but the real miracle is that it was not blocked forever

# COPERNICUS

THOUSANDS of years before Christ, the Chinese had mapped the heavens and knew the movements of the planets so well that they correctly prophesied the positions of the various constellations many years in advance. Twenty-five hundred years before our Christian era a Chinese Governor put to death the astronomers Hi and Ho because they had failed to foretell an eclipse, quite according to the excellent Celestial plan of killing the doctor when the patient dies.

Sir William Hamilton points out the fact that the Chinese, five thousand years ago, knew astronomy as well as we do, and that Christian astrology grew out of Chinese astronomy, in an effort to foretell the fortunes of men.

Fear wants to know the future, and astrology and priesthood are synonymous terms, since the business of the priest has always been to prophesy, a profession he has not yet discarded. Their prophecies are at present innocuous and lightly heeded. They preach that perfect faith will move a mountain, but energetic railroad-builders of today find it quicker and cheaper to tunnel.

# COPERNICUS

CERTAIN type of man accepts a certain theory ☙ ☙

The Christian view of creation was practically the conception of the Greeks before Thales. This wise man, in the Sixth Century before Christ, taught that the earth was round, and that certain stars were also worlds. He showed that the earth was round and proved it by the disappearance of the ship as it sailed away. He located the earth, moon and sun so perfectly that he prophesied an eclipse, and when it took place it so terrified the Medes and the Lydians, who were in battle with each other, that they threw down their arms and made peace. Thales had explained that Atlas carried the world on his shoulder, but he did n't explain what Atlas stood upon.

Pythagoras, one of the pupils of Thales, following the idea still further, showed that the moon derived its light from the sun; that the earth was a globe and turned daily on its axis.

He held that the sun was the center of the universe and that the planets revolved around it. Anaxagoras followed a few years later than Pythagoras, and became convinced that the sun was merely a ball of fire and therefore should not be worshiped; that it follows a natural law, that nothing ever happens by chance, and that to pray for rain is absurd.

For his honesty in expressing what he thought was truth, the priests of Athens had Anaxagoras and his

family exiled to perpetual banishment from Athens and all of his books were burned.

Plato touched on Astronomy, for he touches on everything, and fully believed that the earth was round. ¶ His pupil, Aristotle, taught all that Anaxagoras taught, and if he also had not been exiled, but had been free to study, investigate and express himself, he would have come very close to the truth.

Hipparchus, a hundred years after Aristotle, calculated the length of the year to within six minutes, discovered the precession of equinoxes and counted all the stars he could see, making a map of them.

Seventy years after Christ, Ptolemy, a Greco-Egyptian, but not of the royal line of Ptolemies, published his great book, " The Almagest." For over fourteen centuries it was the textbook for the best astronomers. ¶ It taught that the earth was the center of the universe, and that the sun and the planets revolve around it. There were many absurdities, however, that had to be explained, and the priests practically rejected the whole book as " pagan " and taught an astronomy of their own, founded entirely upon the Bible. They wanted an explanation that would be accepted by the common people.

This astronomy was not designed to be very scientific, exact or truthful—all they asked was, " Is it plausible? " Expediency, to theology, has always been much more important than truth.

" Besides," said Saint Basil, " what boots it concerning all this conjecture about the stars, since the earth is soon to come to an end, as is shown by our Holy Scriptures, and man's business is to prepare his soul for eternity? "

This was the general attitude of the Church—exact truth was a matter of indifference. And if Science tended to unseat men's faith in the Bible, and in God's most holy religion, then so much the worse for Science ☙ It will thus plainly be seen why the Church felt compelled to fight Science—the very life of the Church was at stake.

The Church was the vital thing—not truth. If truth could be taught without unseating faith, why, all right, but anything that made men doubt must be rooted out at any cost. And that is why priests have opposed Science, not that they hate Science less, but that they love the Church more.

From the time of Ptolemy to that of Copernicus—fourteen hundred years—theology practically dictated the learning of the world. And to Copernicus must be given the credit of having really awakened the science of astronomy from her long and peaceful sleep.

# COPERNICUS

THE little land that we know as Poland has produced some of the finest and most acute intellects the world has ever known.

Tragic and blood-stained is her history, and this tragedy, perhaps, has been a prime factor in the evolution of her men of worth. Poland has been stamped upon and pushed apart; and a persecuted people produce a pride of race that has its outcrop in occasional genius.

Recently we heard of the great Paderewski playing before the Czar, and His Majesty, in a speech meant to be very complimentary, congratulated the company that so great a genius as he was a citizen of Russia. ¶ "Your Majesty, I am not a Russian—I am a Pole!" was the proud reply.

The Czar replied, smiling, "There is no such country as Poland—now there is only Russia!"

And Paderewski replied, "Pardon my hasty remark—you speak but truth." And then he played Chopin's "Funeral March," a dirge not only to the great men of Poland gone, but to Poland herself.

Nicholas Copernicus was born at the quaint old town of Thorn, in Poland, February Nineteen, Fourteen Hundred Seventy-three. The family name was Koppernigk, but Nicholas latinized it when he became of age, and seemingly separated from his immediate kinsmen forever.

His father was a merchant, fairly prosperous, and only

in the line of money-making was he ambitious. In the Koppernigks ran a goodly strain of Jewish blood, but a generation before, pressure and expediency seemed to combine, so that the family, as we first see them, were Christians. No soil can grow genius, no seed can produce it—it springs into being in spite of all laws and rules and regulations. " No hovel is safe from it," says Whistler.

The portraits of Copernicus reveal a man of most marked personality: proud, handsome, self-contained, intellectual. The head is massive, eyes full, luminous, wide apart, his nose large and bold, chin strong, the mouth alone revealing a trace of the feminine, as though the man were the child of his mother. This mother had a brother who was a bishop, and the mother's ambition for her boy was that he should eventually follow in the footsteps of this illustrious brother who was known for a hundred miles as a preacher of marked ability. ¶ So we hear of the young man being sent to the University of Cracow, as the preliminary to a great career. ¶ The father bitterly opposed the idea of taking his son out of the practical world of business, and this evidently led to the breach that caused young Nicholas to discard the family name.

That Nicholas did not fully enter into his mother's plans is shown that while at Cracow he devoted himself mostly to medicine. He was so proficient in this that he secured a physician's degree; and having been given

leave to practise he revealed his humanity by declining to do so, turning to mathematics with a fine frenzy. ¶ This disposition to drop on a thing, turn loose on it, concentrate, and reduce it to a chaos, is the true distinguishing mark of genius. The difference in men does not lie in the size of their heads, nor in the perfection of their bodies, but in this one sublime ability of concentration—to throw the weight with the blow, live an eternity in an hour—"This one thing I do!" ¶ Copernicus at twenty-one was teaching mathematics at Cracow, and by his extraordinary ability in this one direction had attracted the attention of various learned men. In fact the authorities of the college had grown a bit boastful of their star student, and when visiting dignitaries arrived, young Copernicus was given chalk and blackboard and put through his paces. Problems involving a dozen figures and many fractions were worked out by him with a directness and precision that made him the wonder of that particular part of the world.

The science of trigonometry was invented by Copernicus, and we see that early in his twenties he was well on the heels of it, for he had then arranged a quadrant to measure the height of standing trees, steeples, buildings or mountains. For rest and recreation he painted pictures.

A college professor from Bologna traveling through Cracow met Copernicus, and greatly impressed with

his powers, invited him to return with him to Bologna and there give a course of lectures on mathematics. ¶ Copernicus accepted, and at Bologna met the astronomer, Novarra. This meeting was the turning-point of his life. Copernicus was then twenty-three years of age, but in intellect he was a man. He had vowed a year before that he would indulge in no trivial conversation about persons or things—only the great and noble themes should interest him and occupy his attention

With commonplace or ignorant people he held no converse. He had remarkable beauty of person and great dignity, and his presence at Bologna won immediate respect for him.

Men accept other men at the estimate they place upon themselves.

In listening to lectures by Novarra, he perceived at once how mathematics could be made valuable in calculating the movement of stars.

Novarra taught the Ptolemaic theory of astronomy for the esoteric few. The Church is made up of men, and while priests for the most part are quite content to believe what the Church teaches, yet it has ever been recognized that there was one doctrine for the Few, and another for the Many—the esoteric and the exoteric. The esoteric is an edged tool, and only a very few are fit to handle it. The charge of heresy is only for those who are so foolish as to give out these edged

tools to the people. You may talk about anything you want, provided you do not do it; and you may do anything you want, provided you do not talk about it ☙ ☙

The proposition that the earth was flat, had four corners, and the stars were jewels hung in the sky as "signs," and were moved about by angels, was all right for the many, but now and then there were priests who were not content with these child-stories—they wanted truth—and these usually accepted the theories of Ptolemy.

Novarra believed that the earth was a globe; that this globe was the center of the universe, and that around the earth the sun, moon and certain stars revolved. The fixed stars he still regarded as being hung against the firmament, and that this firmament was turned in some mysterious way, en masse.

Copernicus listened silently, but his heart beat fast. He had found something upon which he could exercise his mathematics. He and Novarra sat up all night in the belfry of the cathedral and watched the stars. ¶ They saw that they moved steadily, surely and without caprice. It was all natural, and could be reduced, Copernicus thought, to a mathematical system. ¶ Astrology and astronomy were not then divorced. It was astrology that gave us astronomy. The angel that watched over a star looked after all persons who were born under that star's influence, or else appointed

some other angel for the purpose. Every person had a guardian angel to protect him from the evil spirits that occasionally broke out of Hell and came up to earth to tempt men.

Mathematics knows nothing of angels—it only knows what it can prove. Copernicus believed that, if certain stars did move, they moved by some unalterable law of their own. In riding on a boat he observed that the shores seemed to be moving past, and he concluded that a part, at least, of the seeming movements of planets might possibly be caused by the moving of the earth.

In talking with astrologers he perceived that very seldom did they know anything of mathematics. And this ignorance on their part caused him to doubt them entirely.

His faith was in mathematics—the thing that could be proved—and he came to the conclusion that astronomy and mathematics were one thing, and astrology and child-stories another.

He remained at Bologna just long enough to turn the astrologers out of the society of astronomers.

Novarra's lectures on astronomy were given in Latin, and in truth all learning was locked up in this tongue. But astrology and the theological fairy-tales of the people floated free. They were a part of the vagrant hagiology of the roadside preachers, who with lurid imaginations said the things they thought would help

carry conviction home and make "believers." From Bologna Copernicus then moved on to Padua, where he remained two years, teaching and giving lectures. Here he devoted considerable time to chemistry, and on leaving he was honored by being given a degree by the University. Next we find him at Rome, a professor in mathematics and also giving lectures on chemistry. His lectures were not for the populace—they were for the learned few. But they attracted the attention of the best, and were commented upon and quoted by the various other teachers, preachers and lecturers. A daring thinker who expresses himself without reservation states the things that various others know and would like to state if they dared. It is often very convenient when you want a thing said to enclose the matter in quotation-marks. It relieves one from the responsibility of standing sponsor for it, if the hypothesis does not prove popular.

Copernicus was only nineteen years old when Columbus discovered America, but it seems he did not hear of Columbus until he reached Bologna in Fourteen Hundred Ninety-five. At Rome he made various references to Columbus in his lectures; dwelt upon the truth that the earth was a globe; mentioned the obvious fact that in sailing westward Columbus did not sail his ship over the edge of the earth into Hell, as had been prophesied he would.

He also explained that the red sky at sunset was not

caused by the reflections from Hell, nor was the sun moved behind a mountain by giant angels at night. Copernicus was a Catholic, as all teachers were, but he had been deceived by the esoteric and the exoteric, and had really thought that the priests and so-called educated men actually desired, for themselves, to know the truth.

At Padua he had learned to read Greek, and had become more or less familiar with Pythagoras, Hipparchus, Aristotle and Plato. He quoted these authors and showed how in some ways they were beyond the present. This was all done in the exuberance of youth, with never a doubt as to the value and the beauty of the Church. But he was thinking more of truth than of the Church, and when a cardinal from the Vatican came to him, and in all kindness cautioned him, and in love explained it was all right for a man to believe what he wished, but to teach others things that were not authorized was a mistake.

Copernicus was abashed and depressed.

He saw then that his lectures had really been for himself—he was endeavoring to make things plain to Copernicus, and the welfare of the Church had been forgotten.

He ceased lecturing for a time, but private pupils came to him, and among them astrologers in disguise, and these went away and told broadcast that Copernicus was teaching that the movements of the stars

were not caused by angels, and that " God was being dethroned by a tape-measure and a yardstick." Alchemy had a strong hold upon the popular mind, and these alchemists and astrologers were fortune-tellers and derived a goodly income from the people. ¶ They had their stands in front of all churches and turned in a goodly tithe " for the benefit of the poor." ¶ When the astrologers attacked Copernicus he tried to explain that the heavens were under the reign of natural law, and that so far as he knew there was no direct relationship between the stars and the men upon earth. The answer was, " You yourself foretell the eclipse, and assume to know when a star will be in a certain place a hundred years in advance; now, if you can prophesy about stars, why can't we foretell a man's future? "

Copernicus proudly declined to answer such ignorance, but went on to say that alchemy was a violence to chemistry as much as astrology was to astronomy. In chemistry there were exact results that could be computed by mathematics and foretold; it was likewise so in astronomy.

Copernicus was philosopher enough to know that astrology led to astronomy, and alchemy led to chemistry, but he said all he wished to do was to eliminate error and find the truth, and when we have ascertained the laws of God in reference to these things, we should discard the use of black cats, goggles, peaked hats,

red fire and incantations—these things were sacrilege. And the enemy declared that Copernicus was guilty of heresy in saying they were guilty of sacrilege. Moreover, black cats were not as bad as blackboards.

The Pope certainly had no idea of treating Copernicus harshly; in fact, he greatly admired him—but peace was the thing desired. Copernicus was creating a schism, and there was danger that the revenues would be affected. The Pope sent for Copernicus, received him with great honor, blessed him, and suggested that he return at once to his native town of Thorn and there await good news that would come to him soon.

Copernicus was overwhelmed with gratitude—he was in difficulties.

Certain priests had publicly denounced him; others had urged him on to unseemliness in debate; he had stated things he could not prove, even though he knew they were true—but the Pope was his friend! He loved the Church; he felt how necessary it was to the people, and at the last, the desire of his heart was to bless and benefit the world.

He fell on his knees and attempted to kiss the Pope's foot, but the Holy Father offered him his hand instead, smiled on him, stroked his head, and an attendant was ordered to place about his neck a chain of gold with a crucifix that would protect him from all harm. A purse was placed in his hand, and he was sent upon his way relieved, happy—wondering, wondering!

# COPERNICUS

WHEN Copernicus reached his native town of Thorn, the local clergy turned out in a procession to greet him, and a solemn service of thanksgiving was held for his safe return home

Copernicus was only twenty-seven years of age, and what he had done was not quite clear to his uncle, the bishop, and the other dignitaries, but word had come from the secretary of the Pope that he should be honored, and it was all so done, in faith, love and enthusiasm

Very shortly after this Copernicus was made Canon of the Cathedral at Frauenburg. The town of Frauenburg has now only about twenty-five hundred people, and it certainly was no larger then. The place is slow, sleepy, and quite off the beaten track of travel.

When Canon Copernicus preached now, it was to a dear, stupid lot of old marketwomen and overworked men and mischievous children. Oratory is a collaboration—let him wax eloquent about the precession of the equinoxes, and prate of Plato and Pythagoras if he wished—no one could understand him! Rome is wise—the crystallized experience of centuries is hers. Responsibility tames a man—marriage, political office, churchly preferment—read history and note how these things have dulled the bright blade of revolution and turned the radical into a Presbyterian professor at Princeton, a staunch upholder of the

Established Order! ¶ Plato said that Solar Energy found one of its forms of expression in man. Some men are much more highly charged with it than others; your genius is a man who does things. Do not think to dam up the red current of his life—he may die ☙ Copernicus set to work practising medicine, and gave his services gratis to the poor, who came for many miles to consult him.

He went from house to house and ordered his people to clean up their back yards, to ventilate their houses, to bathe and be decent and orderly. He devised a system of sewerage, and utilized the belfry of his church as a water-tower so as to get a water pressure from the little stream that ran near the town. The remains of this invention are to be seen there in the church-steeple even unto this day.

King Sigismund of Poland had heard of the attacks made by Copernicus upon the alchemists, and sent for him that he might profit by his advice, for it seems that the King, too, had been having experience with alchemists. In their seeking after a way to make gold out of the baser metals they had actually succeeded. At least they said so, and had made the King believe it. ¶ They had shown the King how he could cheapen his coinage one-half, and " it was just as good! " The King could not tell the difference when the coins were new, but alas! when they went beyond the borders of Poland they could only be passed at one-half their face-value;

travelers refused to accept them; and even the merchants at home were getting afraid.

Copernicus analyzed some of this money made for the King by his alchemist friends and found a large alloy of tin, copper and zinc. He explained to the King that by mixing the metals they did not change their nature nor value. Gold was gold, and copper was copper—God had made these things and hid them in the earth and men might deceive some men—a part of the time—but there was always a retribution. Debase your currency, and soon it will cease to pass current. No law can long uphold a fictitious value.

The King urged Copernicus to write a book on the subject of coinage.

The permission of the Pope was secured, and the book written. The work is valuable yet, and reveals a deep insight into the heart of things. The man knew political economy, and foretold that a people who debased their currency debased themselves.

"Money is character," he said, "and if you pretend it is one thing, and it turns out to be another, you lose your reputation and your own self-respect. No government can afford to deceive the governed. If the people lose confidence in their rulers, a new government will spring into being, built upon the ruins of the old. Government and commerce are built on confidence."

Then he went on to show that German gold was valuable everywhere, because it was pure; but Polish gold

and Russian gold were below par, because the money had been tampered with, and as no secrets could be kept long, the result was the matter exactly equalized itself, save that Russians and Polanders had in a large degree lost their characters through belief in miracles. Copernicus advocated a universal coinage, to be adopted by all civilized nations, and the amount of alloy should be known and plainly stated, and this alloy should simply be the seigniorage, or what was taken out to cover the cost of mintage.

King Sigismund circulated this valuable book by Copernicus among all the courts of Europe, and it need not be stated that the suggestions made by Copernicus have been adopted by civilized nations everywhere ☙ ☙

# COPERNICUS

THE humdrum duties of a country clergyman did not still the intense longing of Copernicus to know and understand the truth. He visited the sick, closed the eyes of the dying, kept his parish register, but his heart was in mathematics, and so there is shown at Thorn an old church register kept by Copernicus, where, in the back, are great rows of figures put down by the Master as he worked at some astronomical problem. In the upper floor of the barn, back of the old dilapidated farmhouse where he lived for forty years, he cut holes in the roof, and also apertures in the sides of the building, through which he watched the movements of the stars. He lived in practical isolation and exile, for the Church had forbidden him to speak in public except upon themes that the Holy Fathers in their wisdom had authorized. None was to invite him to speak, read his writings or hold converse with him, except on strictly church matters

Copernicus knew the situation—he was a watched man. For him there was no preferment: he knew too much! As long as he kept near home and did his priestly work, all was well; but a trace of ambition or heresy, and he would be dealt with. The Universities and all prominent Churchmen were secretly ordered to leave Copernicus and his vagaries severely alone. But the stars were his companions—they came out for him nightly and moved in majesty across the sky. " They

do me great honor," he said; " I am forbidden to converse with great men, but God has ordered for me a procession." When the whole town slept, Copernicus watched the heavens, and made minute records of his observations. He had brought with him from Rome copies made by himself from the works of the prominent Greek astronomers, and the " Almagest " of Ptolemy he knew by heart.

He digested all that had been written on the subject of astronomy; slowly and patiently he tested every hypothesis with his rude and improvised instruments. " Surely God will not damn me for wanting to know the truth about His glorious works," he used to say.

¶ Emerson once wrote this: " If the stars came out but once in a thousand years, how men would adore! " But before he had written this, Copernicus had said: " To look up at the sky, and behold the wondrous works of God, must make a man bow his head and heart in silence. I have thought and studied, and worked for years, and I know so little—all I can do is to adore when I behold this unfailing regularity, this miraculous balance and perfect adaptation. The majesty of it all humbles me to the dust."

It was ostracism and exile that gave Copernicus the leisure to pursue his studies in quiet, undiverted, undisturbed. He was relieved from financial pinch, having all he needed for his simple, homely wants. The mental distance that separated him from his

parishioners made him free, and the order that he should not travel and that none should visit him made him master of his time. There were no interruptions—" God has set me apart," he wrote, " that I may study and make plain His works." But still, that he could not make his discoveries known was a constant, bitter disappointment to him.

In astronomy he found a means of using his mighty mathematical genius for his own pleasure and amusement. The Pope had, in seeking to subdue him, merely supplied the exact conditions he required to do his work —yet neither knew it. So mighty is Destiny: we work for one thing and fail to get it, but in our efforts we find something better.

The simple, hard-working gardeners with whom Copernicus lived, had a reverent awe for the great man; they guessed his worth, but still had suspicions of his sanity. His nightly vigils they took for a sort of religious ecstasy, and a wholesome fear made them quite willing not to do anything that might disturb him.

So passed the days away, and from a light-hearted, ambitious man, Copernicus had grown old and bowed, and nearly blind from constant watching of the stars and writing at night.

But his book, " The Revolution of the Heavenly Bodies," was at last complete. For forty years he had worked at it, and for twenty-seven years, he himself says, not a day or a night had passed without his having

added something to it. ¶ He felt that he had in this book told the truth. If men wanted to know the facts about the heavens they would find them here. He had approached the subject with no preconceived ideas; he had ever been willing to renounce a theory when he found it wrong. He knew what all other great astronomers had taught, and out of them all he had built a Science of Astronomy that he knew would stand secure

But what should he do with all this mass of truth he had discovered? It was in his own brain, and it was in the three thousand pages of this book, which had been rewritten five times. In a few years at most, his brain would be stilled in death; and in five minutes, ignorance and malice might reduce the book to ashes, and the forty years' labor of Copernicus—working, dreaming, calculating, weeping, praying—would all go for naught and be but a tale that is told. Others might have lived such lives and known as much as he, and all was lost!

To send the book frankly to Rome and ask the Censor for the privilege to publish it, was out of the question entirely—the request would be refused, the manuscript destroyed, and his own life might be in danger.

To publish it at home without the consent of his Bishop would be equally dangerous. There would be a bonfire of every copy in the public square; for in this volume, all that the priests taught of astronomy had been

contradicted and refuted. ¶ And then it occurred to him to send the manuscript to the free city of Nuremberg, the home of science, art and free speech, where men could print what they thought was truth—Nuremberg, the home of Albrecht Durer. With the book he sent a bag of gold, his savings of a lifetime, to pay the expense of printing the volume and putting it before the world.

To better protect himself, Copernicus wrote a preface, dedicating the book to the Pope Paul, thus throwing himself upon the mercy of His Holiness. He would not put the work out anonymously, as his friends in Nuremberg, for his own safety, had advised. And neither would he flee to Nuremberg for protection; he would stay at home—he was too old to travel now—besides, he had forgotten how to talk and act with men of talent.

How would Rome receive the book? He could only guess—he could only guess.

The months went by, and fear, anxiety and suspense had their sway. He was stricken with fever. In his delirium he called aloud, "The book—tell me—they surely have not burned it—you know I wrote no word but truth—oh, how could they burn my book!"

But on May Twenty-third, Fifteen Hundred Forty-three, a messenger came from Nuremberg.

He carried a copy of the printed book—he was admitted to the sick-room, and placed in the hands of the stricken

man the volume. A gleam of sanity came to Copernicus. He smiled, and taking the book gazed upon it, stroked its cover as though caressing it, opened it and turned the leaves. Then closing the book and holding it to his heart, he closed his eyes, and sank to sleep, to awake no more.

His body was buried with simple village honors, and laid to rest beneath the floor of the Cathedral where he had so long ministered, side by side with a long line of priests. On the little slab that marked his resting-place no mention was made of the mighty work he had done for truth. There were fears that when the character of his book was known, the grave of Copernicus would not remain undisturbed, and so the inscription on the headstone was simply this: " I ask not the grace accorded to Paul; not that given to Peter; give me only the favor which Thou didst show to the thief on the cross."

# HUMBOLDT

The actual miracle of the Universe is the invariableness of Law. Under like conditions a like result must follow, and upon this rock is the faith of the Scientists built.

— *The Cosmos*

HUMBOLDT

# HUMBOLDT

THE Baron and Baroness von Hollwede were not happily married ¶ The Baroness had intellect, spirit, aspiration, with an appreciation of all that was best in art, music and the world of thought. As to the Baron, he had drunk life's wine to the lees and pronounced the draft bitter. He was a heavy dragoon with a soul for foxhounds. Later, when gout got to twinging him, he contented himself with cards and cronies.

And then Destiny, like a novelist who does not know what to do with a character, sent him on an excursion across the River Styx.

This was a good move all round, and the only accommodating action in which the Baron ever had a part. He left a large estate, not being able to take it along. ¶ There are two kinds of widows, the bereaved and the relieved. In India no widow is allowed to remarry. The canons of the Episcopal Church forbid any widow or widower to remarry whose former partner is living. A member of the Catholic Church who makes a marital mistake is not allowed to rectify it. Yet Nature, sometimes, as if to prove the foolishness of fearsome little man, justifies that of which man hotly disapproves. ¶ To be a widow of thirty-six, fair of face and comely

in form, to own a beautiful home and have an income greater than you can spend, and still not enough to burden you—what nobler ambition! ¶ The Baroness had a little encumbrance—a son aged ten. I would like to tell of his career, but alas, of him history is silent, save that he was heir to some of his father's proclivities, grew up, became an army officer and passed into obscurity in middle life, dishonored and unswung. ¶ Such a widow as the Baroness von Hollwede is not apt to mourn for long. She was courted by many, but it was Major Humboldt who found favor in her heart. I assume that all of my gentle readers have in them some of the saltness of time, so that details may safely be omitted—let imagination bridge the interesting gap. ¶ The Major was a few years younger than the lady, but like the gallant gentleman that he was, he swore i' faith before the notary that they were of the same age, just as Robert Browning did when officially interrogated as to the age of Elizabeth Barrett. Thomas Brackett Reed avowed that no gentleman ever weighed over two hundred pounds, and I also maintain no gentleman ever married a woman older than himself. ¶ The marriage of Major Humboldt and the Baroness von Hollwede was a most happy mating that fully justified the venture. The Major had done his work bravely in the Seven Years' War, and was now an attache of the King's Court—a man of means, of intellect, and of many strong and beautiful virtues. After

the marriage he became known as Baron von Humboldt, and as to just how he succeeded to the noble title let us not be curious—his wife undoubtedly bestowed it on him, good and generous woman that she was ☙ They lived in the romantic Castle Tegel, near Berlin, and separated from the city by a park, where the dark pines still tower aloft and murmur their secrets to the night breeze.

Tegel is a most beautiful place; it was first a hunting-lodge occupied by Frederick the Great. It is shut out from the world by its high stone walls; and in its dim, dense woods, one might easily imagine he was far indeed from the madding crowd.

Here there were two sons born to the Baron and Baroness—two years apart. One of these sons sleeps now beneath the turret where he first saw the light, and from which he made others see the light as long as he lived.

In Goethe's "Faust" is an allusion to a mysterious legend that had its rise in storied Tegel. On May Eighteenth, in the year Seventeen Hundred Seventy-eight, Goethe came here, walking over from Berlin, dined, and walked on to Potsdam. But before he left he saw two beautiful boys, aged eight and ten, playing beneath the spreading Tegel trees. The boys remembered the event and wrote of it in their journal, mentioning the kindly pats on their heads and the prophecy that they would grow up and be great men.

# HUMBOLDT

Goethe was always patting boys on the head and saying graceful things, and it is doubtful whether his prophecy was more than a mere commonplace. But Goethe always claimed it was divine prophecy. These boys were William and Alexander von Humboldt.

History does not supply another instance of two brothers attaining the intellectual height reached by Alexander and William von Humboldt. This being so, it seems meet that we should tarry a little to inspect the method adopted in the education of these boys—something that the educated world for the most part has not done.

# HUMBOLDT

THIS world of ours, round like an orange and slightly flattened at the poles, has produced only five men who were educated. Of course all education is comparative; but these five are so beyond the rest of mankind that they form a class by themselves.

An educated man means a developed man—a man rounded on every side of his nature. We are aware of no limit to which the mind of man may evolve; other men may appear who will surpass the Immortal Five, but this fact remains: none that we know have. Great men, so-called, are usually specialists: clever actors, individuals with a knack, talented comedians—who preach, carve, paint, orate, fight, manipulate, manage, teach, write, perform, coerce, bribe, hypnotize, accomplish, and get results. There are great financiers, sea-captains, mathematicians, football players, engineers, bishops, wrestlers, runners, boxers, and players on zithern-strings. But these are not necessarily very great men, any more than poets, painters and pianists, with wonderful hirsute effects and strange haberdashery are great men.

For it is intellect and emotion expanded in every direction that give the true title to greatness. Judged in this way, how rare is the educated man—five in six thousand years! And yet one of these five educated men had a brother nearly as great as he.

Alexander von Humboldt was past fifty before the world

of thinking men realized that he had outstripped his brother William—and Alexander would never admit he had ☙ ☙

These two men, handsome in face, form and feature: strong in body and poised in mind, with souls athirst to realize and to know—happy men, living long lives of useful effort—surely should be classed as educated persons ☙ ☙

And in passing, let us note that all education is preparatory—it is life that gives the finals, not the college. The education of the von Humboldt boys was the Natural Method—the method advocated by Rousseau—the education by play and work so combined that study never becomes irksome nor work repulsive. Rousseau said, "Make a task repugnant and the worker will forever quit it as soon as the pressure that holds him to it is removed."

The parents of Alexander and William von Humboldt carefully studied the new plan of education that was at that time being advocated by some of the best professors at Berlin. "A child must have a teacher," said Jean Jacques, "but a professional teacher is apt to become the slave of his profession, and when this occurs he has separated himself from life, and therefore to that degree is unfitted to teach."

A school should not be a preparation for life: a school should be life. The Kindergarten Idea, among other things, suggests that a child should never know he is

in school. ¶ The discipline is kept out of sight, and the youngster finds himself a part of the busy life. He blends in with the others, and works, plays and sings under the wise and loving care of his " other mother," the teacher. He is living, not simply preparing to live. All life should be joyous, spontaneous, natural. The Rousseau Idea, which was modified and refined by Froebel, is the utilization of the propensity to play.

Major von Humboldt found a man who was saturated with the true Froebel spirit, although this was before Froebel was born.

The man's name was Heinrich Campe. Heinrich was hired to superintend the education of the Humboldt boys. That is to say, he was to become comrade, friend, counselor, fellow-scholar, playmate and teacher.

Play needs direction as well as work. Campe played with the boys. They lived with Nature—made lists of all the trees at Tegel, drew sketches of the leaves and fruit, calculated the height of trees, measured them at the base, and cut them down occasionally, first sitting in judgment on the case, and deciding why a certain tree should be removed, thus getting a lesson in scientific forestry.

They became acquainted with the bugs, beetles, birds and squirrels. They cared for the horses, cattle and fowls, and best of all they learned to wait on themselves. ¶ Campe told them tales of history—of Achilles, Pericles and Cæsar. Then they studied Greek, that

they might read of Athens in the language of the men who made Athens great. They translated " Robinson Crusoe " into the German language, and Campe's translation of " Robinson Crusoe " is today a German classic. It was all natural—interesting, easy. The day was filled with work and play, and joyous tales of what had been said by others in days agone.

" Teach only what you know, and never that which you merely believe," said Rousseau.

There is still a cry that religion should be taught in the public schools. If we ask, " What religion? " the answer is, " Ours, of course! "

Religious dogma, being a matter of belief, was taught to the Humboldts as a part of history.

So these boys very early became acquainted with the dogmas of Confucianism, Mohammedanism, Christianity. They separated, compared and analyzed, and saw for themselves that dogmatic religions were all much alike. To know all religions is to escape slavery to any. In studying the development of races these boys saw that a certain type of religion fits a certain man in a certain stage of his evolution, and so perhaps to that degree religion is necessary. An ethnologist is never a Corner Grocery Infidel. The C. G. I. is very apt to be converted at the first revival, outrivaling all other " seekers," and when warm weather comes, falling from grace and dropping easily into scofferdom.

¶ The Humboldts, like Thoreau, never had any quarrel

with God, and they were never tempted to go forward to the Mourners' Bench.

Origin and destiny did not trouble them; predestination and justification by faith were not even in their curriculum; foreordination and baptism were to them problems not to be taken seriously.

By studying religions in groups and incidentally, they learned to distinguish the fetish in each. They read Greek mythology side by side with Judean mythology and noted similarities. The intent of Tutor Campe was to give these boys a scientific education. Science is only classified commonsense. To be truly scientific is to know differences—to distinguish between this and that. Every successful farmer has traveled a long way into science, for science deals with the maintenance of life. To know soils, animals and vegetation is to be scientific ☙ ☙

But when the average farmer learns to transmute compost into grass and grain, and these into beef, he usually stops, content. To be a scientist in the true sense, one must love knowledge for its own sake, and not merely for what it will bring on market-day, and so the Humboldts were led on through the stage of wanting to make money, to the stage of wanting to know the why and wherefore. It will be seen that the education of the Humboldts was what the Boylston Professor of English at Harvard calls "faddism, or the successful effort at flabbiness." Our Harvard friend

thinks that education should be a discipline—that it should be difficult and vexatious, and that happiness, spontaneity and exuberance are the antitheses and the foes of learning. To him grim earnestness, silence, sweat and lamp-smoke are preferable to sunshine and joyous, useful work so wisely directed that the pupil thinks it play. He believes that to be sincere we must be serious. In these latter-day objections there is nothing new. Socrates met them all; Rousseau heard the cry of "fad"; Heyne, Pestalozzi, Campe, Knuth and Froebel met the carpist and answered him reason for reason, just as Copernicus, Bruno and Galileo told the reason the earth revolved. The professional teacher who can do nothing but teach—the college professor who is a college professor and nothing else —hates the Natural Method man about as ardently as the person who wears a paste diamond hates the lapidary

# HUMBOLDT

HEINRICH CAMPE was the tutor of the Humboldts for two years, when he entered the employ of the King as Commissioner of Education.

After this, however, he continued to spend one day a week at Tegel for some time. He loved the boys as his own, and his hope for their future never relaxed. Possibly his interest was not wholly disinterested—with the help of these lads he was working out and proving his pedagogic theories.

When Campe resigned his immediate tutorship he was allowed to select his successor, and he chose a young man by the name of Christian Knuth.

The mother was a member of this little university of four persons; Knuth, of course, was a member, for he always considered himself more of a student than a teacher.

When Campe resigned in favor of Knuth his action was in degree prompted by his love and consideration for the boys. Knuth was only a little past twenty, and was able to enter into the out-of-door sports and work of the youngsters better than the older man. Knuth was their hero—together they rode horseback, climbed mountains, excavated tunnels, mined for ore, built miniature houses. "Knuth made every good thing in Berlin available to us," wrote William years afterward; "we visited stores, factories, barracks and schools, and became familiar with a thousand

common-place things never taught in schools and colleges."

When Alexander was twelve years old, the father died. This would have been a severe blow to the boys were it not for Knuth, who seemed to stand to them more as the real parent than did Major von Humboldt. ¶ Knuth was a businessman of no mean ability. The Baroness now trusted him with all her financial affairs. He called on the boys to help him in the details of business, so the keeping of accounts and the economical handling of money were lessons they learned early in life

When Alexander was seventeen and William nineteen, the mother and Knuth decided that the boys should have the advantages of university life. Accordingly they were duly entered at the University of Frankfort as " special students."

Knuth also entered as a student in the class with them. Special students, let it be known, are usually those who have failed to pass the required examinations. In this instance, Alexander and William were beyond many of their classmates in some things, but in others they were deficient. Especially had their education in the dead languages been " neglected," so it is quite likely they could not have passed the examinations had they attempted it.

It should also be explained that special students are not eligible to diplomas or degrees. ¶ But Campe and

Knuth did not believe the nerve-racking plan of examinations wise, any more than it is wisdom to pull up a plant and examine the roots to see how it prospers. Neither did they prize a college degree.

They knew full well that a college degree is no proof of excellence of character; to them a degree was too cheap a thing to deviate in one's orbit to secure. They were after bigger game.

At Frankfort, Knuth and his charges lived in the family of Professor Loffler, " so as to rub off a little knowledge from this learned man." They studied history, philosophy, law, political economy and natural history. We would say their method was desultory, were it not for the fact that they were always thorough in all that they undertook. They were simply three boys together, intent on getting their money's worth.

¶ William was a little better student than Alexander, and was the leader; he was larger in stature and seemed to have more vitality.

Two years were spent at the University of Frankfort, and then our trio moved on to the University of Gottingen, where there were distinguished lecturers on Natural History and Archeology. Antiquity especially interested the boys, and the evolution and history of races were followed with animation.

William took especially to philosophy as expressed in the writings of Kant, while Alexander developed a love for botany and what he called " the science of

out-of-doors." ¶ Two years at Gottingen, following the bent of their minds and listening only to those lectures they liked, and they moved on to Jena.

Here they were in the Goethe country. Soon there were overtures from Berlin that they enter the service of the Government. These overtures were set in motion by Campe, who, however, kept out of sight in the matter, and when accused, stoutly declared that it was every man's duty to help himself, and that he personally had never helped any one get a position and never would.

William was twenty-three and Alexander twenty-one. William was gracious and graceful in manner and made himself at home in the best society; Alexander was studious, reserved and inclined to be shy.

An invitation came that they should visit Weimar and spend some weeks in that little world of art and letters created by Goethe and Schiller. To William this was very tempting; but Alexander saw at Weimar scant opportunity to study botany and geology & Besides that, he felt that sooner or later he would drift into the employ of the Government, following in his father's footsteps. His ambition was practical mining, with a taste for finance.

The brothers kissed each other good-by, and one went to Weimar to assist Schiller in editing a magazine that did not pay expenses, to bask in the sunshine of the great Goethe, and incidentally to secure a wife. ¶ The

other started on a geological excursion, and this excursion was to continue through life, and make of the man the greatest naturalist that the world had seen since Aristotle lived, two thousand years before.

# HUMBOLDT

HUMBOLDT'S first book was on the geological formation of the Rhine, published when he was twenty-six years old. The work was so complete and painstaking that it led to his being appointed to the position of " Assessor of Mines " at Berlin. This was the same office that Swedenborg once held in Scandinavia.

For the benefit of our social-science friends, it is rather interesting to note that at this time in Europe nearly all mines belonged to the Government.

An individual might own the surface, and up to the sky, but his claim did not go to the center of the earth. Iron, coal, copper, silver and gold were largely mined, and the Government operated the mines direct, or else leased them on a percentage.

I am told that in America all mining is done by individuals or private companies, and that four-fifths of all mining companies have no mines at all—merely samples of ores, blueprints, photographs and prospects. The genus promoter is a very modern production, and is a creation Humboldt never knew; the " salting " of mines was out of his province, and mining operations carried on exclusively in sky-scrapers was a combination he never guessed.

Whether society will ever take a turn backward, and the whole people own and control the treasures deposited by Nature in the earth, is a question I will leave to my Marxian colleagues to determine. ¶ As a mine-

manager Humboldt was hardly a success. He knew the value of ores, utilized various by-products that had formerly been thrown away, made plans for the betterment of his workers, and once sent a protest to the King against allowing women and children to be employed underground.

But the price per ton of his product was out of proportion to the expenses. While other men mined the ore he wrote a book on "Subterranean Vegetation." The details of business were not to his liking. His own private financial affairs were now turned over to Knuth, his modest fortune resolved into cash and invested in bonds that brought a low rate of interest. Freedom was his passion—to come and go at will was his desire. The thirst for travel was upon him—travel, not for adventure, but for knowledge.

He resigned his office and tramped with knapsack on back across the Alps. The habit of his mind was that of the naturalist-investigator. Geology, botany and zoology were his properties by divine right.

These sciences really form one—geognosy, or the science of the formation of the earth. The plants dissolve and disintegrate the rocks; the animal feeds upon the plants; and animal life makes new forms of vegetation possible. So the mineral, vegetable and animal kingdoms evolve together, constantly tending toward a greater degree of refinement and complexity.

The very highest form of animal life is man; and the

highest type of man is evolved where there is a proper balance between the animal and the vegetable kingdoms

Humboldt discovered very early in his career that the finest flowers grow where there are the finest birds, and man separated from birds, beasts and flowers could not possibly survive.

Just about this time, Humboldt, taking the cue from Goethe, said: " Man is a product of soil and climate, and is brother to the rocks, trees and animals. He is dependent on these, and all things seem to point to the truth that he has evolved from them. The accounts of special creation are interesting as archeology, but biology is distinctly the business of modern scientists. The scientist tells what he knows, and the theologist what he believes."And again we find Humboldt writing from Switzerland in Seventeen Hundred Ninety-six, making observations that have been recently unconsciously paraphrased by the United States Secretary of Agriculture, who said in a printed report: " Western farmers who raise and sell hogs and cattle, feeding them grain instead of selling it, are sure to acquire a competence. The farmers who sell grain are the ones who do not pay off their mortgages."

Says Humboldt:

" Here on the sides of these towering and forbidding mountains we find the most fertile and beautiful miniature farms, nestling in little valleys or on plateaus.

Indeed, I heard today of a man falling out of his farm and being seriously injured. He ventured too near the edge.

These Swiss gardens with their prosperous and intelligent owners are only possible through the fact that the owners keep all the cows and poultry that can comfortably exist on the acres. The peasants sell butter, cheese and eggs, instead of grain and vegetables exclusively.

"They give back to the earth all that they take from it, so in the course of a hundred years a fine soil evolves that supports valuable animals, including valuable men; choice fruit, flowers and birds appear, and we have what we are pleased to call Christian civilization. It is not for me to quibble about terms, but civilization is not necessarily Christian, since it is more a matter of economics and natural science than religion."

Where the climate is fairly propitious, but not so much so but that it compels watchfulness, economy and effort, man will work, and to aid him in his work he utilizes domestic animals. And the very act of domesticating the animal domesticates the man. As man improves the animal, he improves himself. One reason why the American Indian did not progress was because he had neither horses, camels, oxen, swine nor poultry. He had his dog, and the dog is a wolf, and always remains one, in that his intent is on prey. This fitted the mood of the Indian, and he continued to live his

predaceous career without a particle of evolution. To stand still is to retreat, and there is evidence that long before the year Fourteen Hundred Ninety-two, there was a North American Indian that was a better Indian than the Indians who watched the approach of Columbus and exclaimed, "Alas! we are discovered!"

In crossing the Alps, Humboldt was impressed with the truth that man was a necessary factor in working out "creation," just as much as the earthworm. When men stir the soil so as to make it produce grain that the family may be fed, and utilize animals in this work, civilization is surely at hand.

Nations with a controlling desire to absorb, annex and exploit are still to that degree savages. Creation is still going on, and this earth is becoming better and more beautiful as men work in line with reason and allow science to become the handmaid of instinct. Humboldt, above all men, prepared the way for Darwin, Spencer and Tyndall—all of these built on him, all quote him. His books form a mine in which they constantly delved.

Humboldt in boyhood formed the habit of close and accurate observation, and he traveled that he might gratify this controlling impulse of his life—the habit of seeing and knowing. His genius for classification was superb; he approached every subject with an open mind, willing to change his conclusions if it were shown that he was wrong; he had imagination to see the thing

first with his inward eye; he had the strength to endure physical discomfort, and finally he had money enough so he was free to follow his bent. ¶ These qualifications made him the prince of scientific travelers—the pioneer of close, accurate and reliable explorers.

# HUMBOLDT

BEFORE Humboldt's time travelers had been mostly of the type of Marco Polo and Sir John Mandeville, who discovered strange and wondrous things, such as horses with five legs, dogs that could talk, and anthropophagi with heads that grew beneath their shoulders. The temptation to be interesting at the expense of truth has always been strong upon the sailorman. Read even the history of Christopher Columbus and you will hear of islands off the coast of America inhabited exclusively by women who had only one calling-day in a year when their gentlemen friends from a neighboring island came to see them.

The world needed accurate, scientific knowledge concerning those parts of the world seldom visited by man. Travel a hundred years ago was accompanied by great expense and more or less peril. Nations held themselves aloof from one another, and travelers were looked upon as renegades or spies.

Alexander von Humboldt had explored deep mines, climbed high mountains, visited that strange people, the Basques of Spain, got little glimpses into Africa where the jungle was waiting for a Livingstone and a Stanley before giving up its secrets. The Corsican had thrown Europe into a fever of fear, and war was on in every direction, when in Seventeen Hundred Ninety-nine Humboldt ran the blockade and sailed out of the harbor of Coruna, Spain, on the little corvette

"Pizarro," bound for the Spanish possessions in the New World. Spain had discovered America in the gross two hundred years before, but what this country really contained in way of possibilities, Spain had most certainly never discovered.

Humboldt's mind had conceived the idea of a Scientific Survey, and in this he was the maker of an epoch. In this undertaking he secured the assistance of the Prime Minister, who secretly issued passports and letters of recommendation to Humboldt, first cautioning him that if the Court of Madrid should know anything about this proposed voyage of discovery it could never be made, so jealous and ignorant were the officials ☙ Only one thing did Spain have in abundance, and that was religion.

At that time the Spanish Colonies included Louisiana, Florida, Texas, California, Mexico, Cuba, Central America, most of the West Indies, and most of South America, not to mention the Philippines. These colonies covered a territory stretching over five thousand miles from North to South. Twice a year Spain sent out her trading-ships, convoyed by armed cruisers. Trade then was monopoly and extortion. The goods sent out were as cheap and tawdry as could be palmed off; all that were brought back were bartered for at the lowest possible prices.

Cheating in count, weight and quality was then considered perfectly proper, and as the Government

officials at home got a goodly grab into all transactions in way of perquisites, all went swimmingly—or fairly so

For a Spaniard to trade with any other nation was treason, and if caught, his property was confiscated and probably his head forfeited.

No foreigners were allowed in the colonies, and exclusion was the rule. To hold her dependencies Spain thought she must keep them under close subjection; and she seemed beautifully innocent of the fact that she was the dependent, not they. She did not believe in Free Trade

The Government was absolutely under military rule. Of the botany, zoology, geology, not to mention the topography, of her American possessions, the officials of Spain knew nothing save from the tales of sailors.

¶ Such were the Spanish conditions when Humboldt got himself smuggled on board the "Pizarro," and sailed away, June Fourth, Seventeen Hundred Ninety-nine. With Humboldt was one companion, Bonpland, a Swiss by birth, and a rare soul.

Humboldt was a naturalist and a philosopher; by nature he was a traveler. But he lacked that intrepid quality possessed by, say, Lewis and Clarke.

He had too much brain—too fine a nerve-quality to face the forest alone. Bonpland made good all that he lacked. He used to call Bonpland his "Treasure." And surely such a friend is a treasure, indeed. Bonpland

was a linguist, as most of the Swiss are. He was a mountain-climber, and had been a soldier and a sailor, and he knew enough of literature and science, so he was an interesting companion.

He was small in stature, lithe, immensely strong, absolutely fearless, and had left behind him neither family nor friends to mourn his loss. To Humboldt he was guide, teacher, protector and friend. Bonpland was the soul of unselfishness.

Perhaps a certain quality of man attracts a certain quality of friend—I really am not sure. But this I know, that while Alexander von Humboldt had few personal friends, he always had just those which his nature required—his friends were hands, feet, eyes and ears for him, to quote his own words. This voyage on the "Pizarro" occupied five years. The travelers visited Teneriffe, Cuba, Mexico, and skirted the coast of South America, making many little journeys inland. ¶ They climbed mountains that had never been scaled before; they ascended rivers where no white man had ever been, and pushed their way through jungle and forest to visit savage tribes who fled before them in terror thinking they were gods. On the return trip they visited the United States; spent some weeks in Washington, where they were the guests of the President, Thomas Jefferson. A firm friendship sprang up between Humboldt and Jefferson: they were both freethinkers, and when Humboldt recorded in his

journal that Jefferson was by far the greatest man living in America, he not only recorded his personal conviction, but he spoke the truth.

And as if not to be outdone, although he did not then know what Humboldt had said of him, Jefferson declared that Alexander von Humboldt was the greatest man he ever saw.

Most of the vast number of rare specimens and natural-history curiosities gathered by Humboldt and Bonpland were placed on a homeward-bound ship that sailed from South America. This ship was lost and all the precious and priceless cargo went for naught. Had Humboldt and his companion sailed on this ship, as they had at first intended, instead of returning by way of the United States, the world would not have known the name of Alexander von Humboldt.

But Fate for once was kind—the world had great need of him

# HUMBOLDT

WHEN Humboldt landed at Bordeaux in August, in Eighteen Hundred Four, after his five-year journey, he immediately set out to visit his brother, who was then German Ambassador at Rome. We can imagine that it was a most joyous meeting.

Of it William said: "I could not recognize him for my tears—but beside this he seemed to have grown in stature and was as brown as a Malay. Was he really my brother? Ah, the hand was the hand of Esau, but when he spoke, it was the same kind, gentle, loving voice—the voice of my brother."

A few weeks at Rome and Alexander grew restless for work. He had made great plans about publishing the record of his travels. This work was to outstrip anything in bookmaking the world had ever seen, dealing with similar subjects. The writing was done on shipboard, by campfires, and in forest and jungle, but now it had all to be gone over and revised and much of it translated into French, for the original notes were sometimes in English and sometimes in German. Only in Paris could the work of bookmaking be done that would fill Humboldt's ideals. In Paris were printers, engravers, artists, binders—Paris was then the artistic center of the world, as it is today.

The results of this first great scientific voyage of discovery were written out in a work of seventeen volumes. ¶ It was entitled, "The Travels of Humboldt

and Bonpland in the Interior of America." Humboldt wrote the book, but wanted his friend to have half the credit. This superb set of books, containing many engravings, was issued under Humboldt's supervision and almost entirely at his own expense. It was divided into five general parts: Zoology and Comparative Anatomy; Geography and the Distribution of Plants; Political Essays and Description of Peoples and Institutions in the Kingdom of New Spain; Astronomy and Magnetism; Equinoctial Vegetation. It took two years to issue the first volume, but the others then came along more rapidly, yet it was ten years before the last book of the set was published. The total expense of issuing this set of books was more than a million francs, or, to be exact, two hundred twenty-six thousand dollars. ¶ The cost of a set of these books to subscribers was two thousand five hundred fifty dollars, although there were a few sets containing hand-colored plates and original drawings that were valued at twenty thousand dollars. One such set can now be seen at the British Museum. In all, only three hundred sets of these books were issued. ¶ One set at least came to North America, for it was presented to Thomas Jefferson, and, if I am not mistaken, is now in the Congressional Library at Washington. ¶ This American Expedition forever fixed Alexander von Humboldt's place in history, but after it was completed and the record written out, he had still more than half a century to live.

# HUMBOLDT

AT a time when few men could afford the luxury, Alexander von Humboldt was an atheist. Fortunately he had sufficient fortune to place him beyond reach of the bread-and-butter problem, and all of his books were written in the language of the esoteric. He did not serve as an iconoclast for the common people—his name was never on the tongue of rumor—very few, indeed, knew of his existence. His books were issued in deluxe, limited editions, and were for public libraries, the shelves of nobility or rich collectors.

Humboldt was judicial in all of his statements, approaching every question as if nothing were known about it. He built strong, and was preparing the way, such as throwing up ramparts and storing ammunition for the first decisive battle that was to take place between Theology and Science.

In his day Theology was supreme, the practical dictator of human liberties. But a World's Congress of Freethinkers has recently been held in Rome.

There were present more than three thousand delegates, representing every civilized country on the globe. The deliberations of the Congress were held in a hall supplied by the Italian Government, and all courtesies and privileges were tendered the delegates. The only protest came from the Pope, who turned Protestant and in all the Catholic churches in Rome ordered special services, to partially mitigate the blot upon the fair record of

the "Holy City." Forty years ago armed men would have routed this Congress by force, and a hundred years ago the bare thought of such a meeting would have placed a person who might have suggested it in imminent peril.

Humboldt prophesied that the world would not forever be ruled by religious superstition—that science must surely win. But he did not expect that the change would come as quickly as it has; neither did he anticipate the fact that the orthodox religion would admit all the facts of science and still flourish. The number of Church communicants now is larger than it was in the time of Humboldt. The Church is a department-store that puts in the particular goods that the people ask for. ¶ Freethinkers do not leave the Church; the Church is built on a Goodyear patent, and its lines expand when Freethinkers get numerous, so as to include them

The Church would rather countenance vice, as it has in the past, than disband. In New York City we now have the spectacle of the Church operating a saloon and selling strong drink. In all country towns, religion, failing in being attractive, has, to keep churches alive, resorted to raffles, lotteries, concerts, chicken-pie socials, and lectures and exhortations by strange men in curious and unique garb, and singers of reputation. ¶ The Church, being a part of society, evolves as society evolves. Christianity is a totally different

thing now from what it was in Humboldt's time; it was a different thing in Humboldt's time from what it was a hundred years before.

Behold the spectacle of a thousand highly educated and gentle men, from all over the world, decorating with garlands the statue of Bruno in Rome, on the site where Churchmen piled high the fagots and burned his living body! I foretell that when the next World's Congress of Freethinkers occurs in Rome, the Pope will welcome the delegates, and their deliberations will occur by invitation in the wide basilica of Saint Peter's. The world moves, and the Pope and all the rest of us move with it.

When a meeting was recently called in Jersey City to welcome Turner, the so-called anarchist, the Mayor forbade the meeting and then placed a cordon of policemen around the intended meeting-place. But, lo, in their extremity the "anarchists" were invited by a clergyman to come and use his church and he led the way to the sacred edifice, warning the police to neither follow nor enter. As we become better we meet better preachers.

Humboldt could see no rift through the clouds outside of the death of the Church and the disbanding of her so-called sacred institutions. We now perceive that very rarely are religious opinions consciously abandoned; they change, are modified and later evolve into something else. Churches are now largely social

clubs. In America this is true both of Catholic and of Protestant. Most all denominations are interested in social betterment, because the trend of human thought is in that direction.

The Church is being swept along upon the tide of time. In a few instances churches have already evolved practical industrial betterments, which are conducted directly under the supervision of the church and in its edifice. There are hundreds of Kindergartens now being carried on in church buildings that a few years ago were idle and vacant all the week. Others have sewing-circles and boys' clubs, and these have metamorphosed in some instances into Manual-Training Schools where girls are taught Domestic Science and boys are given instruction in the Handicrafts. I know a church that derives its support from the sale of useful things that are made by its members and workers under the supervision of its pastor, who is a master in handicraft. So this pretty nearly points the ideal—a church that has evolved into an ethical and industrial college, where the pastor is not paid for preaching, but for doing

Charles Bradlaugh once said:

"A paid priesthood blocks evolution. These men are really educated to uphold and defend the institution. They can do nothing else. Most of them have families dependent upon them—do you wonder that it is a fight to the death? It is not truth that the clergy struggles

for—they may think it is—but the grim fact remains, it is a fight for material existence."

We all confuse our interests with the eternal verities —the thing that pays us we consider righteous, or at least justifiable. This is the most natural thing in the world. An artist who painted very bad pictures once took one of his canvases to Whistler for criticism ☙ Jimmy shrugged his shoulders and made a grimace that spoke volumes. " But a man must live some way! " pleaded the poor fellow in his extremity.

" I do not see the necessity," was the weary reply ☙ Preachers must live; their education and environment have unfitted them for useful effort; but they are a part of the great, seething struggle for existence. And so we have their piteous and plaintive plea for the obsolete and the outworn. Disraeli once in an incautious moment exclaimed: " If we do away with the Established Church, what is to become of the fourteen million prepared and pickled sermons? Think for a moment of the infinite labor of writing new sermons, all based upon a different point of view—let us then be reasonable and not subject a profession that is overworked to the humiliation of destroying the bulk of its assets."

Science deals directly with the maintenance of human life and the bettering of every condition of existence through a wider, wiser and saner use of the world. Civilization is the working out and comprehending and proving how to live in the best way. Theology

prepares men to die; science fits them to live. ¶ Science deals with your welfare in this world; theology in another. Theology has not yet proved that there is another world—its claims are not even based upon hearsay. It is a matter of belief and assumption.

Science, too, assumes, and its assumption is this: The best preparation for a life to come is to live here and now as if there were no life to come.

Your belief will not fix your place in another world —what you are, may. The individual who gets most out of this life is fitting himself to get most out of another if there is one.

And this brings us up to that paragraph in the "Cosmos" where Humboldt says: "I perceive a period when the true priesthood will not be paid to defend a fixed system of so-called crystallized truth. But I believe the time will come when that man will be most revered who bestows most benefits here and now. The clergy of Christendom have stood as leaders of thought, but to hold this proud position they must abandon the intangible and devote themselves to this world and the people who are alive."

# HUMBOLDT

MOST of Humboldt's time during his middle life was spent at Paris, where he was busily engaged in the herculean task of issuing his splendid books. He varied his work, however, so that several hours daily were devoted to study and scientific research; and from time to time he made journeys over Europe and Asia.

In Eighteen Hundred Twenty-seven a personal request came from the King of Prussia that Humboldt should thereafter make Berlin his home. He was too big a man for Germany to lose.

He acceded to the King's request, moved to Berlin and was spoken of as "The First Citizen," although he would not consent to hold office, nor would he accept a title

In vexed questions of diplomacy he was often consulted by the King and his Cabinet, and in a great many ways he furthered the interests of education and civilization by his judicial and timely advice.

He was always a student, always an investigator, always a tireless worker. He lived simply and quietly —keeping out of society and away from crowds, except on the rare occasions when necessity seemed to demand it

The quality of the man was well mirrored in those magnificent books—all that he did was on the scale of grandeur.

His books were too high in price for the average reader,

but on request of the King he consented to give a course of five, free, popular lectures for the people.

No one foresaw the result of these addresses. The course was so successful that it extended itself into sixty-one lectures, and covered a period of more than ten years' time. No admittance was charged, free tickets being given out to applicants. Very soon after the first lecture, a traffic sprang up in these free tickets, carried on by our Semitic friends, and the tickets soared to as high as three dollars each. Then the strong hand of the Government stepped in: the tickets were canceled, and the public was admitted to the lectures without ceremony. Boxes, however, were set apart for royalty and foreign visitors, some of whom came from England, Belgium, Switzerland and France. The size of these audiences was limited simply by the capacity of the auditorium, the attendance at first being about a thousand; later, a larger hall was secured and the attendance ran as high as four thousand persons at each address.

The subjects were as follows: three lectures on the History of Science; two on reasons why we should study Science; four on the Crust of the Earth, and the nature of Volcanoes and Earthquakes; two on the form of Earth's Surface and the elevation of the Continents; five on Physical Geography; five on the nature of Heat and Magnetism; sixteen on Astronomy; two on Mountains and how they are formed; three on the Nature of the Sea; three on the Distribution of Matter; ten

on the Atmosphere as an Elastic Fluid; three on the Geography of Animals; three on Races of Men.

Every good thing begins as something else, and what was intended for the common people became scientific lectures for educated people. " The man who was most benefited by these lectures was myself," said Humboldt.

¶ Men grow by doing things. Lectures are for the lecturer

Humboldt found out more things in giving these lectures than he knew before—he discovered himself. And long before they were completed he knew that his best work was embodied right here—in doing for others he had done for himself.

In attempting to reveal the Universe or " Cosmos," he revealed most of his own comprehensive intelligence. That many of his conclusions have since been abandoned by the scientific world does not prove such ideas valueless—they helped and are helping men to find the truth.

¶ These sixty-one " popular " and free lectures make up that stupendous work now known to us as " Humboldt's Cosmos."

# HUMBOLDT

SAYS Robert Ingersoll in his tribute to Alexander von Humboldt:

"His life was pure, his aims were lofty, his learning varied and profound, and his achievements vast.

"We honor him because he has ennobled our race, because he has contributed as much as any man, living or dead, to the real prosperity of the world. We honor him because he has honored us—because he has labored for others—because he was the most learned man of the most learned nation of his time—because he left a legacy of glory to every human being. For these reasons he is honored throughout the world.

"Millions are doing homage to his genius at this moment, and millions are pronouncing his name with reverence and recounting what he accomplished.

"We associate the name of Humboldt with oceans, continents, mountains, volcanoes—with towering palms—the snow-lipped craters of the Andes—the wide deserts—with primeval forests and European capitals—with wilderness and universities—with savages and savants—with the lonely rivers of unpeopled wastes—with peaks, pampas, steppes, cliffs and crags—with the progress of the world—with every science known to man and with every star glittering in the immensity of space. Humboldt adopted none of the soul-shrinking creeds of his day; he wasted none of his time in the inanities, stupidities and contradictions of theological

metaphysics; he did not endeavor to harmonize the astronomy and geology of a barbarous people with the science of the Nineteenth Century. ¶ Never, for one moment, did he abandon the sublime standard of truth: he investigated, he studied, he thought, he separated the gold from the dross in the crucible of his brain. He was never found on his knees before the altar of superstition. He stood erect by the tranquil column of Reason. He was an admirer, a lover, an adorer of Nature, and at the age of ninety, bowed by the weight of nearly a century, covered with the insignia of honor, loved by a nation, respected by a world, with kings for his servants, he laid his weary head upon her bosom—upon the bosom of the Universal Mother—and with her loving arms about him, sank into that slumber which we call Death.

"History added another name to the starry scroll of the immortals.

"The world is his monument; upon the eternal granite of her hills he inscribed his name, and there, upon everlasting stone, his genius wrote this, the sublimest of truths: The universe is governed by law."

# WILLIAM HERSCHEL

The great number of alterations of stars that we are certain have happened within the last two centuries, and the much greater number that we have reason to suspect to have taken place, are curious features in the history of the heavens, as curious as the slow wearing away of the landmarks of our earth on mountains, on river banks, on ocean shores. If we consider how little attention has formerly been paid this subject, and that most of the observations we have are of a very late date, it would perhaps not appear extraordinary were we to admit the number of alterations that have probably happened to different stars, within our own time, to be a hundred.

—*William Herschel.*

HERSCHEL

# WILLIAM HERSCHEL

ILLIAM HERSCHEL, born Seventeen Hundred Thirty-eight, in the city of Hanover, was the fourth child in a family of ten. Big families, I am told, usually live in little houses, while little families live in big houses. The Herschels were no exception to the rule.

Isaac Herschel, known to the world as being the father of his son, was a poor man, depending for support upon his meager salary as bandmaster to a regiment of the Hanoverian Guards.

At the garrison school, taught by a retired captain, William was the star scholar. In mathematics he propounded problems that made the worthy captain pooh-pooh and change the subject.

At fourteen, he was playing a hautboy in his father's band and practising on the violin at spare times. For music he had a veritable passion, and to have a passion for a thing means that you excel in it—excellence is a matter of intensity. One of the players in the band was a Frenchman, and William made an arrangement to give the "parlez vous" lessons on the violin as payment for lessons in French.

This whole brood of Herschel children was musical, and very early in life the young Herschels became self-

supporting as singers and players. " It is the only thing they can do," their father said. But his loins were wiser than his head.

In Seventeen Hundred Fifty-five William accompanied his father's band to England, where they went to take part in a demonstration in honor of a Hanoverian, one George the Third, who later was to play a necessary part in a symphony that was to edify the American Colonies. America owes much to George the Third.

¶ Young Herschel had already learned to speak English, just as he had learned French. In England he spent all the money he had for three volumes of " Locke on the Human Understanding."

These books were to remain his lifelong possession and to be passed on, well-thumbed, to his son more than half a century later.

At the time of the breaking out of the Seven Years' War, William Herschel was nineteen. His regiment had been ordered to march in a week. Here was a pivotal point—should he go and fight for the glory of Prussia?

Not he—by the connivance of his mother and sisters, he was secreted on a trading-sloop bound for England. This is what is called desertion; and just how the young man evaded the penalties, since the King of England was also Elector of Hanover, I do not know, but the House of Hanover made no effort toward punishment of the culprit, even when the facts were known.

Musicians of quality were, perhaps, needed in England; and as sheep-stealing is looked upon lightly by priests who love mutton, so do kings forgive infractions if they need the man.

When William Herschel landed at Dover he had in his pocket a single crownpiece, and his luggage consisted of the clothes he wore, and a violin. The violin secured him board and lodgings along the road as he walked to London, just as Oliver Goldsmith paid his way with a similar legal tender.

In London, Herschel's musical skill quickly got him an engagement at one of the theaters. In a few months we hear of his playing solos at Brabandt's aristocratic concerts. Little journeys into " the provinces " were taken by the orchestra to which Herschel belonged. Among other places visited was Bath, and here the troupe was booked for a two-weeks' engagement. At this time Bath was run wide open.

Bath was a rendezvous for the gouty dignitaries of Church and State who had grown swag through sloth and much travel by the gorge route. There were ministers of state, soldiers, admirals-of-the-sea, promoters, preachers, philosophers, players, poets, polite gamblers and buffoons.

They idled, fiddled, danced, gabbled, gadded and gossiped. The " School for Scandal " was written on the spot, with models drawn from life. It was n't a play—it was a cross-section of Bath Society. ¶ Bath

was a clearing-house for the wit, learning and folly of all England—the combined Hot Springs, Coney Island, Saratoga and Old Point Comfort of the Kingdom. The most costly church of its size in America is at Saint Augustine, Florida. The repentant ones patronize it in Lent; the rest of the year it is closed. ¶ At Bath there was the Octagon Chapel, which had the best pipe-organ in England. Herschel played the organ: where he learned how nobody seemed to know —he himself did not know. But playing musical instruments is a little like learning a new language.

A man who speaks three languages can take a day off and learn a fourth almost any time. Somebody has said that there is really only one language, and most of us have only a dialect. Acquire three languages and you perceive that there is a universal basis upon which the various tongues are built.

Herschel could play the hautboy, the violin and the harpsichord. The organ came easy. When he played the organ in the Chapel at Bath, fair ladies forgot the Pump-Room, and the gallants followed them—naturally. Herschel became the rage. He was a handsome fellow, with a pride so supreme that it completed the circle, and people called it humility. He talked but little, and made himself scarce—a point every genius should ponder well.

The disarming of the populace—confiscating canes, umbrellas and parasols—before allowing people to

enter an art-gallery is necessary; although it is a peculiar comment on humanity to think people have a tendency to smite, punch, prod and poke beautiful things. The same propensity manifests itself in wishing to fumble a genius. Get your coarse hands on Richard Mansfield if you can! Corral Maude Adams—hardly. To do big things, to create, breaks down tissue awfully, and to mix it with society and still do big things for society is impossible.

At Bath, Herschel was never seen in the Pump-Room, nor on the North Parade. People who saw him paid for the privilege. " In England about this time look out for a shower of genius," the almanackers might have said

To Bath came two Irishmen, Edmund Burke and Richard Brinsley Sheridan. Burke rented rooms of Doctor Nugent, and married the doctor's daughter, and never regretted it. Sheridan also married a Bath girl, but added the right touch of romance by keeping the matter secret, with the intent that if either party wished to back out of the agreement it would be allowed. This was quite Irish-like, since according to English Law a marriage is a marriage until Limbus congeals and is used for a skating-rink.

With the true spirit of chivalry, Sheridan left the questions of publicity or secrecy to his wife: she could have her freedom if she wished. He was a fledgling barrister, with his future in front of him, the child of

" strolling players "; she, the beautiful Miss Linlay, was a singer of note. Her father was the leader of the Bath Orchestra, and had a School of Oratory where young people agitated the atmosphere in orotund and tremolo and made the ether vibrate in glee. Doctor Linlay's daughter was his finest pupil, and with her were elucidated all his theories concerning the Sixteen Perspective Laws of Art. She also proved a few points in stirpiculture. She was a most beautiful girl of seventeen when Richard Brinsley Sheridan led her to the altar, or I should say to a Dissenting Pastor's back door by night. She could sing, recite, act, and impersonate in pantomime and Greek gown, the passions of Fear, Hate, Supplication, Horror, Revenge, Jealousy, Rage and Faith.

Romney moved down to Bath just so as to have Miss Linlay and Lady Hamilton for models. He posed Miss Linlay as the Madonna, Beulah, Rena, Ruth, Miriam and Cecilia; and Lady Hamilton for Susannah at the Bath, Alicia and Andromache, and also had her illustrate the Virtues, Graces, Fates and Passions ☙ When the beautiful Miss Linlay, the pride and pet of Bath, got ready to announce her marriage, she did it by simply changing the inscription beneath a Romney portrait that hung in the anteroom of the artist's studio, marking out the words " Miss Linlay," and writing over it, " Mrs. Richard Brinsley Sheridan."

The Bath porchers who looked after other people's

business, having none of their own, burbled and chortled like siphons of soda, and the marvel to all was that such a brilliant girl should thus throw herself away on a sprig of the law. "He acts, too, I believe," said Goldsmith to Doctor Johnson.

And Doctor Johnson said, "Sir, he does nothing else," thus anticipating James McNeil Whistler by more than a hundred years.

But alas for the luckless Linlay, the Delsarte of his day, poor man! he used words not to be found in Johnson's Dictionary, and outdid Cassius in the quarrel-scene to the Brutus of Richard Brinsley.

But very soon things settled down—they always do when mixed with time—and all were happy, or reasonably so, forever after.

Herschel resigned from Brabandt's Orchestra and remained in Bath. He taught music, played the organ, became first violinist for Professor Linlay and later led the orchestra when Linlay was on the road starring the one-night stands and his beautiful daughter.

Things seemed to prosper with the kindly and talented German. He was reserved, intellectual, and was respected by the best. He was making money—not as London brokers might count money, but prosperous for a mere music-teacher.

And so there came a day when he bought out the school of Professor Linlay, and became proprietor and leader of the famous Bath Orchestra ❧ But the talented

Mrs. Richard Brinsley Sheridan was sorely missed—a woman soloist of worth was needed.

Herschel thought and pondered. He tried candidates from London and a few from Paris. Some had voices, but no intellect. A very few had intellect, but were without voice. Some thought they had a voice when what they had was a disease. Other voices he tried and found guilty ☙ Those who had voice and spirit had tempers like a tornado.

¶ Herschel decided to educate a soloist and assistant. To marry a woman for the sake of educating her was risky business—he knew of men who had tried it—for men have tried it since the time of the Cavemen.

¶ A bright thought came to him! He would go back to Deutschland and get one of his sisters, and bring her over to England to help him do his work—just the very thing!

IT was a most fortunate stroke for Herschel when he went back home to get one of his sisters to come over into Macedonia and help him. No man ever did a great work unless he was backed up by a good woman. There were five of these Herschel girls—three were married, so they were out of the question, and another was engaged. This left Caroline as first, last and only choice. Caroline was twenty-two and could sing a little.

She had appeared in concerts for her father when a child. But when the father died, the girl was set to work in a dressmaking and millinery shop, to help support the big family. The mother did n't believe that women should be educated—it unfitted them for domesticity, and to speak of a woman as educated was to suggest that she was a poor housekeeper.

In Greece of old, educated women were spoken of as "companions"—and this meant that they were not what you would call respectable. They were the intellectual companions of men. The Greek term of disrespect carried with it a trifle of a suggestion not intended, that is, that women who were not educated —not intellectual—were really not companionable—but let that pass. It is curious how this idea that a woman is only a scullion and a drudge has permeated society until even the women themselves partake of the prejudice against themselves.

Mother Herschel did n't want her daughters to become

educated, nor study the science of music nor the science of anything. A goodly grocer of the Dutch School had been picked out as a husband for Caroline, and now if she went away her prospects were ruined—Ach, Mein Gott! or words to that effect. And it was only on William's promise to pay the mother a weekly sum equal to the wages that Caroline received in the dress-making-shop that she gave consent to her daughter's going. Caroline arrived in England, wearing wooden shoon and hoops that were exceeding Dutch, but without a word of English. In order to be of positive use to her brother, she must acquire English and be able to sing—not only sing well, but remarkably well. In less than a year she was singing solo parts at her brother's concerts, to the great delight of the aristocrats of Bath.

They heard her sing, but they did not take her captive and submerge her in their fashionable follies as they would have liked to do.

The sister and the brother kept close to their own rooms. Caroline was the housekeeper, and took a pride in being able to dispense with all outside help. She was small in figure, petite, face plain but full of animation. All of her spare time she devoted to her music. After the concerts she and her brother would leave the theater, change their clothes and then walk off into the country, getting back as late as one or two o'clock in the morning. On these midnight walks they used to

study the stars and talk of the wonderful work of Kepler and Copernicus. There were various requests that Caroline should go to London and sing, but she steadfastly refused to appear on a stage except where her brother led the orchestra. About this time Caroline wrote a letter home, which missive, by the way, is still in existence, in which she says: " William goes to bed early when there are no concerts or rehearsals. He has a bowl of milk on the stand beside him, and he reads Smith's ' Harmonics ' and Ferguson's 'Astronomy.' I sit sewing in the next room, and occasionally he will call to me to listen while he reads some passage that most pleases him. So he goes to sleep buried beneath his favorite authors, and his first thought in the morning is how to obtain instruments so we can study the harmonics of the sky." And a way was to open: they were to make their own telescopes—what larks! Brother and sister set to work studying the laws of optics. In a secondhand store they found a small Gregorian reflector which had an aperture of about two inches. ¶ This gave them a little peep into the heavens, but was really only a tantalization.

They set to work making a telescope-tube out of pasteboard. It was about eighteen feet long, and the " board " was made in the genuine pasteboard way—by pasting sheet after sheet of paper together until the substance was as thick and solid as a board.

So this brother and sister worked at all odd hours

pasting sheet after sheet of paper—old letters, old books —with occasional strips of cloth to give extra strength. Lenses were bought in London, and at last our precious musical pair, with astronomy for their fad, had the satisfaction of getting a view of Saturn that showed the rings.

It need not be explained that astronomical observations must be made out of doors. Further, the whole telescope must be out of doors so as to get an even temperature. This is a fact that the excellent astronomers of the Mikado of Japan did not know until very recently. It seems they constructed a costly telescope and housed it in a costly observatory-house, with an aperture barely large enough for the big telescope to be pointed out at the heavens. Inside, the astronomer had a comfortable fire, for the season was then Winter and the weather cold. But the wise man could see nothing and the belief was getting abroad that the machine was bewitched, or that their Yankee brothers had lawsonized the buyers, when our own David P. Todd, of Amherst, happened along and informed them that the heat-waves which arose from their warm room caused a perturbation in the atmosphere which made star-gazing impossible. At once they made their house over, with openings so as to insure an even temperature, and Prince Fusiyama Noguchi wrote to Professor Todd, making him a Knight of the Golden Dragon on special order of the heaven-born Mikado. ¶ The Herschels

knew enough of the laws of heat and refraction to realize they must have an even temperature, but they forgot that pasteboard was porous.

One night they left their telescope out of doors, and a sudden shower transformed the straight tube into the arc of a circle. All attempts to straighten it were vain, so they took out the lenses and went to work making a tube of copper. In this, brother, sister and genius—which is concentration and perseverance—united to overcome the innate meanness of animate and inanimate things. A failure was not a failure to them—it was an opportunity to meet a difficulty and overcome it ☙ The partial success of the new telescope aroused the brother and the sister to fresh exertions. The work had been begun as a mere recreation—a rest from the exactions of the public which they diverted and amused with their warblings, concussions and vibrations ☙ They were still amateur astronomers, and the thought that they would ever be anything else had not come to them. But they wanted to get a better view of the heavens—a view through a Newtonian reflecting-telescope. So they counted up their savings and decided that if they could get some instrument-maker in London to make them a reflecting-telescope six feet long, they would be perfectly willing to pay him fifty pounds for it. This study of the skies was their only form of dissipation, and even if it was a little expensive it enabled them to escape the Pump-Room rabble and flee

boredom and introspection. A hunt was taken through London, but no one could be found who would make such an instrument as they wanted for the price they could afford to pay. They found, however, an amateur lens-polisher who offered to sell his tools, materials and instruments for a small sum. After consultation, the brother and sister bought him out. So at the price they expected to pay for a telescope they had a machine-shop on their hands.

The work of grinding and polishing lenses is a most delicate business. Only a person of infinite patience and persistency can succeed at it

In Allegheny, Pennsylvania, lives John Brashear, who, by his own efforts, assisted by a noble wife, graduated from a rolling-mill and became a maker of telescopes. ¶ Brashear is practically the one telescope lens-maker of America since Alvan Clark resigned. There is no competition in this line—the difficulties are too appalling for the average man. The slightest accident or an unseen flaw, and the work of months or years goes into the dustbin of time, and all must be gone over again. ¶ So when we think of this brother and sister sailing away upon an unknown ocean—working day after day, night after night, week after week, and month after month, discarding scores of specula which they had worked upon many weary hours in order to get the glass that would serve their purpose—we must remove our hats in reverence.

# WILLIAM HERSCHEL

GOD sends great men in groups. From Seventeen Hundred Forty for the next thirty-five years the intellectual sky seemed full of shooting-stars. Watt had watched to a purpose his mother's teakettle; Boston Harbor was transformed into another kind of Hyson dish; Franklin had been busy with kite and key; Gibbon was writing his "Decline and Fall"; Fate was pitting the Pitts against Fox; Hume was challenging worshipers of a Fetish and supplying arguments still bright with use; Voltaire and Rousseau were preparing the way for Madame Guillotine; Horace Walpole was printing marvelous books at his private press at Strawberry Hill; Sheridan was writing autobiographical comedies; David Garrick was mimicking his way to immortality; Gainsborough was working the apotheosis of a hat; Reynolds, Lawrence, Romney, and West, the American, were forming an English School of Art; George Washington and George the Third were linking their names preparatory to sending them down the ages; Boswell was penning undying gossip; Blackstone was writing his "Commentaries" for legal lights unborn; Thomas Paine was getting his name on the blacklist of orthodoxy; Burke, the Irishman, was polishing his brogue so that he might be known as England's greatest orator; the little Corsican was dreaming dreams of conquest; Wellesley was having presentiments of coming difficulties; Goldsmith was giving dinners with

bailiffs for servants; Hastings was defending a suit where the chief participants were to die before a verdict was rendered; Captain Cook was giving to this world new lands; while William Herschel and his sister were showing the world still other worlds, till then unknown

WHEN the brother and sister had followed the subject of astronomy as far as Ferguson had followed it, and knew all that he knew, they thought they surely would be content.

Progress depends upon continually being dissatisfied. Now Ferguson aggravated them by his limitations ☙ In their music they amused, animated and inspired the fashionable idlers.

William gave lessons to his private pupils, led his orchestra, played the organ and harpsichord, and managed to make ends meet, and would have gotten reasonably rich had he not invested his spare cash in lenses, brass tubes, eyepieces, specula and other such trifles, and stood most of the night out on the lawn peering at the sky.

He had been studying stars for seven years before the Bath that he amused awoke to the fact that there was a genius among them. And this genius was not the idolized Beau Nash whose statue adorned the Pump-Room! No, it was the man whose back they saw at the concerts.

During all these years Herschel had worked alone, and he had scarcely ever mentioned the subject of astronomy with any one save his sister.

One night, however, he had moved his telescope into the middle of the street to get away from the shadows of the houses. A doctor who had been out to answer a midnight call stopped at the unusual sight and asked

if he might look through the instrument. ¶ Permission was courteously granted. The next day the doctor called on the astronomer to thank him for the privilege of looking through a better telescope than his own. The doctor was Sir William Watson, an amateur astronomer and all-round scientist, and member of the Royal Society of London.

Herschel had held himself high—he had not gossiped of his work with the populace, cheapening his thought by diluting it for cheap people. Watson saw that Herschel, working alone, isolated, had surpassed the schools ✍ ✍

There is a nugget of wisdom in Ibsen's remark, " The strongest man is he who stands alone," and Kipling's paraphrase, " He travels the fastest who travels alone." ¶ The chance acquaintance of Herschel and Watson soon ripened into a very warm friendship.

Herschel amused the neurotics, Watson dosed and blistered them—both for a consideration. Each had a beautiful contempt for the society they served. Watson's father was of the purple, while Herschel's was of the people, but both men belonged to the aristocracy of intellect. Watson introduced Herschel into the select scientific circle of London, where his fine reserve and dignity made their due impress. Herschel's first paper to the Royal Society, presented by Doctor Watson, was on the periodical star in Collo Ceti. The members of the Society, always very jealous and suspicious of

outsiders, saw they had a thinker to deal with. ¶ Some one carried the news to Bath—a great astronomer was now among them! About this time Horace Walpole said, "Mr. Herschel will content me if, instead of a million worlds, he can discover me thirteen colonies well inhabited by men and women, and can annex them to the Crown of Great Britain in lieu of those it has lost beyond the Atlantic."

Bath society now took up astronomy as a fad, and fashionable ladies named the planets both backward and forward from a blackboard list set up in the Pump-House by Fanny Burney, the clever one.

Herschel was invited to give popular lectures on the music of the spheres. Herschel's music-parlors were besieged by good people who wanted to make engagements with him to look through his telescope.

One good woman gave the year, month, day, hour and minute of her birth and wanted her fortune told. Poor Herschel declined, saying he knew nothing of astronomy, but could give her lessons in music if desired.

In answer to the law of supply and demand, thus proving the efficacy of prayer, an itinerant astronomer came down from London and set up a five-foot telescope on the Parade and solicited the curious ones at a tuppence a peep. This itinerant interested the populace by telling them a few stories about the stars that were not recorded in Ferguson, and passed out his cards showing where he could be consulted as a

fortune-teller during the day. Herschel was once passing by this street astronomer, who was crying his wares, and a sudden impulse coming over him to see how bad the man's lens might be, he stopped to take a peep at Earth's satellite. He handed out the usual tuppence, but the owner of the telescope loftily passed it back saying, "I takes no fee from a fellow-philosopher!" This story went the rounds, and when it reached London it had been amended thus: Charles Fox was taking a ramble at Bath, ran across William Herschel at work, and mistaking him for an itinerant, the great statesman stopped, peeped through the aperture, and then passing out a tuppence moved along blissfully unaware of his error, for Herschel being a perfect gentleman would not embarrass the great man by refusing his copper

When Herschel was asked if the story was true he denied the whole fabric, which the knowing ones said was further proof of his gentlemanly instincts—for a true gentleman will always lie under two conditions: first, to save a woman's honor; and second, to save a friend from embarrassment. As a profession, astrology has proved a better investment than astronomy. Astronomy has nothing to offer but abstract truth, and those who love astronomy must do so for truth's sake. ¶ Astronomical discoveries can not be covered by copyright or patent, nor can any new worlds be claimed as private property and financed by stock companies,

frenzied or otherwise. Astrology, on the other hand, relates to love-affairs, vital statistics, goldmines, misplaced jewels and lost opportunities.

Yet, in this year of grace, Nineteen Hundred Five, Boston newspapers carry a column devoted to announcements of astrologers, while the Cambridge Astronomical Observatory never gets so much as a mention from one year's end to the other. Besides that, astronomers have to be supported by endowment—mendicancy—while astrologers are paid for their prophecies by the people whose destinies they invent. This shows us how far as a nation we have traveled on the stony road of Science.

Science, forsooth? Oh, yes, of course—science—bang! bang! bang!

# WILLIAM HERSCHEL

IN the month of March, in Seventeen Hundred Ninety-one, Herschel, by the discovery of Uranus, found his place as a fixed star among the world's great astronomers. Years before this, William and Caroline had figured it out that there must be another planet in our system in order to account plausibly for the peculiar ellipses of the others. That is to say, they felt the influence of this seventh planet; its attractive force was realized, but where it was they could not tell. Its discovery by Herschel was quite accidental. He was sweeping the heavens for comets when this star came within his vision. Others had seen it, too, but had classified it as " a vagrant fixed star."

It was the work of Herschel to discover that it was not a fixed star, but had a defined and distinct orbit that could be calculated. To look up at the heavens and pick out a star that could only be seen with a telescope —pick it out of millions and ascertain its movement— seems like finding the proverbial needle in a haystack.

¶ The present method of finding asteroids and comets by means of photography is simple and easy. The plate is exposed in a frame that moves by clockwork with the earth, so as to keep the same field of stars steady on the glass. After two, three or four hours' exposure, the photograph will show the fixed stars, but the planets, asteroids and comets will reveal themselves as a white streak of light, showing plainly where the sitters moved.

¶ Herschel had to watch each particular star in person, whereas the photographic lens will watch a thousand. ¶ How close and persistent an observer a man must be who, watching one star at a time, discovers the one in a million that moves, is apparent. Chance, surely, must also come to his aid and rescue if he succeeds. ¶ Herschel found his moving star, and at first mistook it for a comet. Later, he and Caroline were agreed that it was in very truth their long-looked-for planet. There are no proprietary rights in newly discovered worlds—the reward is in the honor of the discovery, just as the best recompense for a good deed lies in having done it

The Royal Society was the recording station, as Kiel, Greenwich and Harvard are now. Herschel made haste to get his new world on record through his kind neighbor, Doctor Watson.

The Royal Society gave out the information, and soon various other telescopes corroborated the discovery made by the Bath musician. Herschel christened his new discovery "Georgium Sidus," in honor of the King; but the star belonged as much to Germany and France as to England, and astronomers abroad scouted the idea of peppering the heavens with the names of nobodies

Several astronomers suggested the name "Herschel," if the discoverer would consent, but this he would not do. Doctor Bode then named the new star "Uranus,"

and Uranus it is, although perhaps with any other name 't would shine as bright.

Herschel was forty-three years old when he discovered Uranus. He was still a professional musician, and an amateur astronomer.

But it did not require much urguing on the part of Doctor Watson when he presented Herschel's name for membership in the Royal Society for that most respectable body of scholars to at once pass favorably on the nomination. As one member in seconding the motion put it, " Herschel honors us in accepting this membership, quite as much as we do him in granting it."

And so the next paper presented by Herschel to the Royal Society appears on the record signed " William Herschel, F. R. S."

Some time afterwards, it was to appear, " William Herschel, F. R. S., LL. D. (Edinburgh) "; and then " Sir William Herschel, F. R. S., LL. D., D. C. L. (Oxon)."

# WILLIAM HERSCHEL

GEORGE THE THIRD, in about the year Seventeen Hundred Eighty-two, had invited his distinguished Hanoverian countryman to become an attache of the Court with the title of "Astronomer to the King." The Astronomer-Royal, in charge of the Greenwich Observatory, was one Doctor Maskelyne, a man of much learning, a stickler for the fact, but with a mustard-seed imagination. Being asked his opinion of Herschel he assured the company thus: " Herschel is a great musician—a great musician!" Afterwards Maskelyne explained that the reason Herschel saw more than other astronomers was because he had made himself a better telescope.

One real secret of Herschel's influence seems to have been his fine enthusiasm. He worked with such vim, such animation, that he radiated light on every side. He set others to work, and his love for astronomy as a science created a demand for telescopes, which he himself had to supply. It does not seem that he cared especially for money—all he made he spent for new apparatus. He had a force of about a dozen men making telescopes. He worked with them in blouse and overalls, and not one of his workmen excelled him as a machinist. The King bought several of his telescopes for from one hundred to three hundred pounds each, and presented them to universities and learned societies throughout the world. One fine telescope was presented to the University of Gottingen, and Herschel was sent

in person to present it. He was received with the greatest honors, and scientists and musicians vied with one another to do him homage.

In Seventeen Hundred Eighty-two Herschel and his sister gave up their musical work and moved from Bath to quarters provided for them near Windsor Castle. Herschel's salary was then the modest sum of two hundred pounds a year.

Caroline was honored with the title "Assistant to the King's Astronomer" with the stipend of fifty pounds a year. It will thus be seen that the kingly idea of astronomy had not traveled far from what it was when every really respectable court had a retinue of singers, musicians, clowns, dancers, palmists and scientists to amuse the people somewhat ironically called "nobility." King George the Third paid his Cook, Master of the Kennels, Chaplain and Astronomer the same amount. The father of Richard Brinsley Sheridan was "Elocutionist to the King," and was paid a like sum.

When Doctor Watson heard that Herschel was about to leave Bath he wrote, "Never bought King honor so cheap."

It was nominated in the bond that Herschel should act as "Guide to the heavens for the diversification of visitors whenever His Majesty wills it."

But it was also provided that the astronomer should be allowed to carry on the business of making and selling his telescopes.

Herschel's enthusiasm for his beloved science never abated. But often his imagination outran his facts. ¶ Great minds divine the thing first—they see it with their inward eye. Yet there may be danger in this, for in one's anxiety to prove what he first only imagined, small proof suffices. Thus Herschel was for many years sure that the moon had an atmosphere and was inhabited; he thought that he had seen clear through the Milky Way and discovered empty space beyond; he calculated distances, and announced how far Castor was from Pollux; he even made a guess as to how long it took for a gaseous nebula to resolve itself into a planetary system; he believed the sun was a molten mass of fire—a thing that many believed until they saw the incandescent electric lamp—and in various other ways made daring prophecies which science has not only failed to corroborate, but which we now know to be errors.

But the intensity of his nature was both his virtue and his weakness. Men who do nothing and say nothing are never ridiculous. Those who hope much, believe much, and love much, make mistakes.

Constant effort and frequent mistakes are the stepping-stones of genius.

In all, Herschel contributed sixty-seven important papers to the proceedings of the Royal Society, and in one of these, which was written in his eightieth year, he says, " My enthusiasm has occasionally led me

astray, and I wish now to correct a statement which I made to you twenty-eight years ago." He then enumerates some particular statement about the height of mountains in the moon, and corrects it. Truth was more to Herschel than consistency. Indeed, the earnestness, purity of purpose, and simplicity of his mind stamp him as one of the world's great men.

At Windsor he built a two-story observatory. In the wintertime every night when the stars could be seen, was sacred. No matter how cold the weather, he stood and watched; while down below, the faithful Caroline sat and recorded the observations that he called down to her ☙ ☙

Caroline was his confidante, adviser, secretary, servant, friend. She had a telescope of her own, and when her brother did not need her services she swept the heavens on her own account for maverick comets. In her work she was eminently successful, and five comets at least are placed to her credit on the honor-roll by right of priority. Her discoveries were duly forwarded by her brother to the Royal Society for record.

Later, the King of Prussia was to honor her with a gold medal, and several learned societies elected her an honorary member. When Herschel reached the discreet age of fifty he married the worthy Mrs. John Pitt, former wife of a London merchant. It is believed that the marriage was arranged by the King in person, out of his great love for both parties. At any rate

Miss Burney thought so. Miss Burney was Keeper of the Royal Wardrobe at the same salary that Herschel had been receiving—two hundred pounds a year. She also took charge of the Court Gossip, with various volunteer assistants. " Gold, as well as stars, glitters for astronomers," said little Miss Burney. " Mrs. Pitt is very rich, meek, quiet, rather pretty and quite unobjectionable." But poor Caroline!

It nearly broke her heart. William was her idol—she lived but for him—now she seemed to be replaced. She moved away into a modest cottage of her own, resolved that she would not be an encumbrance to any one. She thought she was going into a decline, and would not live long anyway—she was so pale and slight that Miss Burney said it took two of her to make a shadow. ¶ But we get a glimpse of Caroline's energy when we find her writing home explaining how she had just painted her house, inside and out, with her own hands. ¶ Things are never so bad as they seem. It was not very long before William was sending for Caroline to come and help him out with his mathematical calculations. Later, when a fine boy baby arrived in the Herschel solar system, Caroline forgave all and came to take care of what she called " the Herschel planetoid." She loved this baby as her own, and all the pent-up motherhood in her nature went out to the little " Sir John Herschel," the knighthood having been conferred on him by Caroline before he was a month old.

Mrs. Herschel was beautiful and amiable, and she and Caroline became genuine sisters in spirit. Each had her own work to do; they were not in competition save in their love for the baby. As the boy grew, Caroline took upon herself the task of teaching him astronomy, quite to the amusement of the father and mother. Fanny Burney now comes with a little flung-off nebula to the effect that " Herschel is quite the happiest man in the kingdom." There is a most charming little biography of Caroline Herschel, written by the good wife of Sir John Herschel, wherein some very gentle foibles are laid bare, and where at the same time tribute is paid to a great and beautiful spirit. The idea that Caroline was not going to live long after the marriage of her brother was " greatly exaggerated "—she lived to be ninety-eight, a century lacking two years! Her mind was bright to the last—when ninety she sang at a concert given for the benefit of an old ladies' home. At ninety-six she danced a minuet with the King of Prussia, and requested that worthy not to introduce her as " the woman astronomer, because, you know, I was only the assistant of my brother! " William Herschel died in his eighty-fourth year, with his fame at full, honored, respected, beloved.

Sir John Herschel, his son, was worthy to be called the son of his father. He was an active worker in the field of science—a strong, yet gentle man, with no jealousy nor whim in his nature. " His life was full of the docility

of a sage and the innocence of a child." ¶ John Herschel died at Collingwood, May Eleventh, Eighteen Hundred Seventy-one, and his dust is now resting in Westminster Abbey, close by the grave of England's famous scholar, Sir Isaac Newton.

# CHARLES DARWIN

I feel most deeply that this whole question of Creation is too profound for human intellect. A dog might as well speculate on the mind of Newton! Let each man hope and believe what he can.

—*Charles Darwin to Asa Gray*

None have fought better, and none have been more fortunate, than Charles Darwin. He found a great truth trodden underfoot, reviled by bigots, and ridiculed by all the world; he lived long enough to see it, chiefly by his own efforts, irrefragably established in science, inseparably incorporated into the common thoughts of men. What shall a man desire more than this?

—*Thomas Huxley, Address, April Twenty-seventh, Eighteen Hundred Eighty-two.*

DARWIN

# CHARLES DARWIN

VOLUTION is at work everywhere, even in the matter of jokes. Once in the House of Commons, Benjamin Disraeli, who prided himself on his fine scholarship as well as on his Hyperion curl, interrupted a speaker and corrected him on a matter of history.

" I would rather be a gentleman than a scholar! " the man replied. " My friend is seldom either," came the quick response.

When Thomas Brackett Reed was Speaker of the House of Representatives, a member once took exception to a ruling of the " Czar," and having in mind Reed's supposed Presidential aspirations closed his protests with the thrust, " I would rather be right than President." " The gentleman will never be either," came the instant retort.

But some years before the reign of the American Czar, Gladstone, Premier of England, said, " I would rather be right and believe in the Bible, than excite a body of curious, infidelic, so-called scientists to unbecoming wonder by tracing their ancestry to a troglodyte." And Huxley replied, " I, too, would rather be right —I would rather be right than Premier."

Charles Darwin was a Gentle Man. He was the greatest

naturalist of his time, and a more perfect gentleman never lived. His son Francis said: " I can not remember ever hearing my father utter an unkind or hasty word. If in his presence some one was being harshly criticized, he always thought of something to say in way of palliation and excuse."

One of his companions on the " Beagle," who saw him daily for five years on that memorable trip, wrote: " A protracted sea-voyage is a most severe test of friendship, and Darwin was the only man on our ship, or that I ever heard of, who stood the ordeal. He never lost his temper or made an unkind remark."

Captain Fitz-Roy of the " Beagle " was a disciplinarian, and absolute in his authority, as a sea-captain must be. The ship had just left one of the South American ports where the captain had gone ashore and been entertained by a coffee-planter. On this plantation all the work was done by slaves, who, no doubt, were very well treated. ¶ The captain thought that negroes well cared for were very much better off than if free. And further, he related how the owner had called up various slaves and had the Captain ask them if they wished their freedom, and the answer was always, " No."

Darwin interposed by asking the Captain what he thought the answer of a slave was worth when being interrogated in the presence of his owner.

Here Fitz-Roy flew into a passion, berating the volunteer naturalist, and suggested a taste of the rope's end

in lieu of logic. Young Darwin made no reply, and seemingly did not hear the uncalled-for chidings.

In a few hours a sailor handed him a note from Captain Fitz-Roy, full of abject apology for having so forgotten himself. Darwin was then but twenty-two years old, but the poise and patience of the young man won the respect and then the admiration and finally the affection of every man on board that ship. This attitude of kindness, patience and good-will formed the strongest attribute of Darwin's nature, and to these godlike qualities he was heir from a royal line of ancestry. No man was ever more blest—more richly endowed by his parents with love and intellect—than Darwin. And no man ever repaid the debt of love more fully—all that he had received he gave again.

Darwin is the Saint of Science. He proves the possible; and when mankind shall have evolved to a point where such men will be the rule, not the exception—as one in a million—then, and not until then, can we say we are a civilized people.

Charles Darwin was not only the greatest thinker of his time (with possibly one exception), but in his simplicity and earnestness, in his limpid love for truth —his perfect willingness to abandon his opinion if he were found to be wrong—in all these things he proved himself the greatest man of his time.

Yet it is absurd to try to separate the scientist from the father, neighbor and friend. Darwin's love for

truth as a scientist was what lifted him out of the fog of whim and prejudice and set him apart as a man. ¶ He had no time to hate. He had no time to indulge in foolish debates and struggle for rhetorical mastery —he had his work to do.

That statesmen like Gladstone misquoted him, and churchmen like Wilberforce reviled him—these things were as naught to Darwin—his face was toward the sunrising. To be able to know the truth, and to state it, were vital issues: whether the truth was accepted by this man or that was quite immaterial, except possibly to the man himself. There was no resentment in Darwin's nature.

Only love is immortal—hate is a negative condition. It is love that animates, beautifies, benefits, refines, creates. So firmly was this truth fixed in the heart of Darwin that throughout his long life the only things he feared and shunned were hate and prejudice. " They hinder and blind a man to truth," he said—" a scientist must only love."

# CHARLES DARWIN

EMERSON has been called the culminating flower of seven generations of New England culture. Charles Darwin seems a similar culminating product.

Surely he showed rare judgment in the selection of his grandparents. His grandfather on his father's side was Doctor Erasmus Darwin, a poet, a naturalist, and a physician so discerning that he once wrote: " The science of medicine will some time resolve itself into a science of prevention rather than a matter of cure. Man was made to be well, and the best medicine I know of is an active and intelligent interest in the world of Nature."

Erasmus Darwin had the felicity to have his biography written in German, and he also has his place in the " Encyclopedia Britannica " quite independent of that of his gifted grandson.

Charles Darwin's grandfather on his mother's side was Josiah Wedgwood, one of the most versatile of men. He was as fine in spirit as those exquisite designs by Flaxman that you will see today on the Wedgwood pottery. Josiah Wedgwood was a businessman—an organizer, and he was beyond this, an artist, a naturalist, a sociologist and a lover of his race. His portrait by Sir Joshua Reynolds reveals a man of rare intelligence, and his biography is as interesting as a novel by Kipling. His space in the " Encyclopedia Britannica" is even more important than that occupied by his dear

friend and neighbor, Doctor Erasmus Darwin. The hand of the Potter did not shake when Josiah Wedgwood was made. Josiah Wedgwood and Doctor Darwin had mutually promised their children in marriage. Wedgwood became rich and he made numerous other men rich, and he enriched the heart and the intellect of England by setting before it beautiful things, and by living an earnest, active and beautiful life.

Josiah Wedgwood coined the word "queensware." He married his cousin, Sarah Wedgwood. Their daughter, Susannah Wedgwood, married Doctor Robert Darwin, and Charles Darwin, their son, married Emma Wedgwood, a daughter of Josiah Wedgwood the Second. Caroline Darwin, a sister of Charles Darwin, married Josiah Wedgwood the Third. Let those who have the time work out this origin of species in detail and show us the relationship of the Darwins and Wedgwoods. And I hope we 'll hear no more about the folly of cousins marrying, when Charles Darwin is before us as an example of natural selection

From his mother Darwin inherited those traits of gentleness, insight, purity of purpose, patience and persistency that set him apart as a marked man

The father of Charles Darwin, Doctor Robert Darwin, was a most successful physician of Shrewsbury

His marriage to Susannah Wedgwood filled his heart, and also placed him on a firm financial footing, and

he seemed to take his choice of patients. Doctor Darwin was a man devoted to his family, respected by his neighbors, and he lived long enough to see his son recognized, greatly to his surprise, as one of England's foremost scientists.

Charles Darwin in youth was rather slow in intellect, and in form and feature far from handsome. Physically he was never strong. In disposition he was gentle and most lovable. His mother died when he was eight years of age, and his three older sisters then mothered him. Between them all existed a tie of affection, very gentle, and very firm.

The girls knew that Charles would become an eminent man—just how they could not guess—but he would be a leader of men: they felt it in their hearts. It was all the beautiful dream that the mother has for her babe as she sings to the man-child a lullaby as the sun goes down.

In his autobiographical sketch, written when he was past sixty, Darwin mentions this faith and love of his sisters, and says, "Personally, I never had much ambition, but when at college I felt that I must work, if for no other reason, so as not to disappoint my sisters."

At school Charles was considerable of a grubber: he worked hard because he felt that it was his duty. English boarding-schools have always taught things out of season, and very often have succeeded in making

learning wholly repugnant. Perhaps that is the reason why nine men out of ten who go to college cease all study as soon as they stand on " the threshold," looking at life ere they seize it by the tail and snap its head off. To them education is one thing and life another.

But with many headaches and many heartaches Charles got through Cambridge and then was sent to attend lectures at the University of Edinburgh. Of one lecturer in Scotland he says, " The good man was really more dull than his books, and how I escaped without all science being utterly distasteful to me I hardly know."

To Cambridge, Darwin owed nothing but the association with other minds, yet this was much, and almost justifies the college. " Send your sons to college and the boys will educate them," said Emerson.

The most beneficent influence for Darwin at Cambridge was the friendship between himself and Professor Henslow. Darwin became known as " the man who walks with Henslow." The professor taught botany, and took his classes on tramps afield and on barge rides down the river, giving out-of-door lectures on the way. This commonsense way of teaching appealed to Darwin greatly, and although he did not at Cambridge take up botany as a study, yet when Henslow had an out-of-door class he usually managed to go along.

In his autobiography Darwin gives great credit to this very gentle and simple soul, who, although not being great as a thinker, yet could animate and arouse

a pleasurable interest. ¶ Henslow was once admonished by the faculty for his lack of discipline, and young Darwin came near getting himself into difficulty by declaring, "Professor Henslow teaches his pupils in love; the others think they know a better way!"

The hope of his father and sisters was that Charles Darwin would become a clergyman. For the army he had no taste whatsoever, and at twenty-one the only thing seemed to be the Church. Not that the young man was filled with religious zeal—far from that—but one must, you know, do something. Up to this time he had studied in a desultory way; he had also dreamed and tramped the fields. He had done considerable grouse-shooting and had developed a little too much skill in that particular line.

To paraphrase Herbert Spencer, to shoot fairly well is a manly accomplishment, but to shoot too well is evidence of an ill-spent youth. Doctor Darwin was having fears that his son was going to be an idle sportsman, and he was urging the divinity-school.

The real fact was that sportsmanship was already becoming distasteful to young Darwin, and his hunting expeditions were now largely carried on with a botanist's drum and a geologist's hammer.

But to the practical Doctor these things were no better than the gun—it was idling, anyway. Natural History as a pastime was excellent, and sportsmanship for exercise and recreation had its place, but the business

of life must not be neglected—Charles should get himself to a divinity-school, and quickly, too.

Things urged become repellent; and Charles was groping around for an excuse when a letter came from Professor Henslow, saying, among other things, that the Government was about to send a ship around the world on a scientific surveying tour, especially to map the coast of Patagonia and other parts of South America and Australia. A volunteer naturalist was wanted—board and passage free, but the volunteer was to supply his own clothes and instruments.

The proposition gave Charles a great thrill: he gave a gulp and a gasp and went in search of his father. The father saw nothing in the plan beyond the fact that the Government was going to get several years' work out of some foolish young man, for nothing—gadzooks! ¶ Charles insisted—he wanted to go! He urged that on this trip he would be to but very little expense. " You say I have cost you much, but the fellow who can spend money on board ship must be very clever." " But you are a very clever young man, they say," the father replied. That night Charles again insisted on discussing the matter. The father was exasperated and exclaimed, " Go and find me one sane man who will endorse your wild-goose chase and I will give my consent."

Charles said no more—he would find that " sane man." But he knew perfectly well that if any average person endorsed the plan his father would declare the man was

insane, and the proof of it lay in the fact that he endorsed the wild-goose chase.

In the morning Charles started of his own accord to see Henslow. Henslow would endorse the trip, but both parties knew that Doctor Darwin would not accept a mere college professor as sane. Charles went home and tramped thirty miles across the country to the home of his uncle, Josiah Wedgwood the Second. There he knew he had an advocate for anything he might wish, in the person of his fair cousin, Emma. These two laid their heads together, made a plan and stalked their prey.

They cornered Josiah the Second after dinner and showed him how it was the chance of a lifetime—this trip on H. M. S. the " Beagle "! Charles was n't adapted for a clergyman, anyway; he wanted to be a ship-captain, a traveler, a discoverer, a scientist, an author like Sir John Mandeville, or something else. Josiah the Second had but to speak the word and Doctor Darwin would be silenced, and the recommendation of so great a man as Josiah Wedgwood would secure the place. ¶ Josiah the Second laughed—then he looked sober. He agreed with the proposition—it was the chance of a lifetime. He would go back home with Charles and put the Doctor straight. And he did. ¶ And on the personal endorsement of Josiah Wedgwood and Professor Henslow, Charles Robert Darwin was duly booked as Volunteer Naturalist in Her Majesty's service.

# CHARLES DARWIN

CAPTAIN FITZ-ROY of the " Beagle " liked Charles Darwin until he began to look him over with a very professional eye. Then he declared his nose was too large and was not rightly shaped; besides, he was too tall for his weight: outside of these points the Volunteer would answer. On talking with young Darwin further, the Captain liked him better, and he waived all imperfections, although no promise was made that they would be remedied. In fact, Captain Fitz-Roy liked Charles so well that he invited him to share his own cabin and mess with him. The sailors, on seeing this, touched respectful forefingers to their caps and began addressing the Volunteer as " Sir."

The " Beagle " sailed on December Twenty-seven, Eighteen Hundred Thirty-one, and it was fully four years and ten months before Charles Darwin saw England again. The trip decided the business of Darwin for the rest of his life, and thereby an epoch was worked in the upward and onward march of the race.

Captain Fitz-Roy of the British Navy was but twenty-three years old. He was a draftsman, a geographer, a mathematician and a navigator. He had sailed around the world as a plain tar, and taken his kicks and cuffs with good grace. At the Portsmouth Naval School he had won a gold medal for proficiency in study, and another medal had been given him for heroism in leaping from a sailing-ship into the sea to save a drowning

sailor. ¶ Let us be fair—the tight little island has produced men. To evolve these few good men she may have produced many millions of the spawn of earth, but let the fact stand—England has produced men. Here was a beardless youth, slight in form, silent by habit, but so well thought of by his Government that he was given charge of a ship, five officers, two surgeons and forty-one picked men to go around the world and make measurements of certain coral-reefs, and map the dangerous coasts of Patagonia and Tierra del Fuego ✠ The ship was provisioned for two years, but the orders were, " Do the work, no matter how long it may take, and your drafts on the Government will be honored." Captain Fitz-Roy was a man of decision: he knew just where he wanted to go, and what there was to do. He was to measure and map dreary wastes of tossing tide, and to do the task so accurately that it would never have to be done again: his maps were to remain forever a solace, a safety and a security to the men who go down to the sea in ships.

England has certainly produced men—and Fitz-Roy was one of them. Fitz-Roy is now known to us, not for his maps which have passed into the mutual wealth of the world, but because he took on this trip, merely as an afterthought, a volunteer naturalist.

Before the " Beagle " sailed, Captain Fitz-Roy and young Mr. Darwin went down to Portsmouth, and the Captain showed him the ship. The Captain took pains

to explain the worst. It was to be at least two years of close, unremitting toil. It was no pleasure-excursion —there were no amusements provided, no cards, no wine on the table; the fare was to be simple in the extreme. This way of putting the matter was most attractive to Darwin—Fitz-Roy became a hero in his eyes at once. The Captain's manner inspired much confidence—he was a man who did not have to be amused or cajoled. " You will be left alone to do your work," said Fitz-Roy to Darwin, " and I must have the cabin to myself when I ask for it." And that settled it. Life aboard ship is like life in jail. It means freedom, freedom from interruption—you have your evenings to yourself, and the days as well. Darwin admired every man on board the ship, and most of all, the man who selected them, and so wrote home to his sisters. He admired the men because each was intent on doing his work, and each one seemed to assume that his own particular work was really the most important

Second Officer Wickham was entrusted to see that the ship was in good order, and so thorough was he that he once said to Darwin, who was constantly casting his net for specimens, " If I were the skipper, I 'd soon have you and your beastly belitterment out of this ship with all your devilish, damned mess." And Darwin, much amused, wrote this down in his journal, and added, " Wickham is a most capital

fellow." The discipline and system of ship-life, the necessity of working in a small space, and of improving the calm weather, and seizing every moment when on shore, all tended to work in Darwin's nature exactly the habit that was needed to make him the greatest naturalist of his age.

Every sort of life that lived in the sea was new and wonderful to him. Very early on this trip Darwin began to work on the "Cirripedia" (barnacles), and we hear of Captain Fitz-Roy obligingly hailing homeward-bound ships, and putting out a small boat, rowing alongside, asking politely, to the astonishment of the party hailed, "Would you oblige us with a few barnacles off the bottom of your ship?" All this that the Volunteer, who was dubbed the "Flycatcher," might have something upon which to work.

When on shore a sailor was detailed by Captain Fitz-Roy just to attend the "Flycatcher," with a bag to carry the specimens, geological, botanical and zoological, and a cabin-boy was set apart to write notes. This boy, who afterward became Governor of Queens and and a K. C. B., used in after years to boast a bit, and rightfully, of his share in producing "The Origin of Species." When urged to smoke, Darwin replied, "I am not making any new necessities for myself."

When the weather was rough the "Flycatcher" was sick, much to the delight of Wickham; but if the ship was becalmed, Darwin came out and gloried in the

sunshine, and in his work of dissecting, labeling, and writing memoranda and data. The sailors might curse the weather—he did not. Thus passed the days. At each stop many specimens were secured, and these were to be sorted and sifted out at leisure.

On shore the Captain had his work to do, and it was only after a year that Darwin accidentally discovered that the sailor who was sent to carry his specimens was always armed with knife and revolver, and his orders were not so much to carry what Wickham called, "the damned plunder," as to see that no harm befell the "Flycatcher."

Fitz-Roy's interest in the scientific work was only general: longitude and latitude, his twenty-four chronometers, his maps and constant soundings, with minute records, kept his time occupied.

For Darwin and his specimens, however, he had a constantly growing respect, and when the long five-year trip was ended, Darwin realized that the gruff and grim Captain was indeed his friend. Captain Fitz-Roy had trouble with everybody on board in turn, thus proving his impartiality; but when parting was nigh, tears came to his eyes as he embraced Darwin, and said, with prophetic yet broken words, "The 'Beagle's' voyage may be remembered more through you than me—I hope it will be so!" And Darwin, too moved for speech, said nothing except through the pressure of his hand.

# CHARLES DARWIN

THE idea of evolution took a firm hold upon the mind of Darwin, in an instant, one day while on board the "Beagle." From that very hour the thought of the mutability of species was the one controlling impulse of his life. On his return from the trip around the world he found himself in possession of an immense mass of specimens and much data bearing directly upon the point that creation is still going on.

That he could ever sort, sift and formulate his evidence on his own account, he never at this time imagined. Indeed, about all he thought he could do was to present his notes and specimens to some scientific society, in the hope that some of its members would go ahead and use the material.

With this thought in mind he began to open correspondence with several of the universities and with various professors of science, and to his dismay found that no one was willing even to read his notes, much less house, prepare for preservation, and index his thousands of specimens.

He read papers before different scientific societies, however, from time to time, and gradually in London it dawned upon the few thinkers that this modest and low-voiced young man was doing a little thinking on his own account. One man to whom he had offered the specimens bluntly explained to Darwin that his specimens and ideas were valuable to no one but

himself, and it was folly to try to give such things away. Ideas are like children and should be cared for by their parents, and specimens are for the collector. ¶ Seeing the depression of the young man, this friend offered to present the matter to the Secretary of the Exchequer. Everything can be done when the right man takes hold of it: the sum of one thousand pounds was appropriated by the Treasury for Charles Darwin's use in bringing out a Government report of the voyage of the " Beagle." And Darwin set to work, refreshed, rejoiced and encouraged. He was living in London in modest quarters, solitary and alone. He was not handsome, and he lacked the dash and flash that make a success in society. On a trip to his old home, he walked across the country to see his uncle, Josiah Wedgwood the Second.

When he left it was arranged that he should return in a month and marry his cousin, Emma Wedgwood. And it was all so done.

One commentator said he married his cousin because he did n't know any other woman that would have him. But none was so unkind as to say that he married her in order to get rid of her, yet Henslow wondered how he ceased wooing science long enough to woo the lady ☙ ☙

Doubtless the parents of both parties had a little to do with the arrangement, and in this instance it was beautiful and well. Darwin was married to his work,

and no such fallacy as marrying a woman in order to educate her filled his mind.

His wife was his mental mate, his devoted helper and friend. ¶ It is no small matter for a wife to be her husband's friend.

Mrs. Darwin had no small aspirations of her own. She flew the futile Four-o'Clock and made no flannel nightgowns for Fijis. Twenty years after his marriage, Darwin wrote thus: " It is probably as you say—I have done an enormous amount of work. And this was only possible through the devotion of my wife, who, ignoring every idea of pleasure and comfort for herself, arranged in a thousand ways to give me joy and rest, peace and most valuable inspiration and assistance. If I occasionally lost faith in myself, she most certainly never did. Only two hours a day could I work, and these to her were sacred. She guarded me as a mother guards her babe, and I look back now and see how hopelessly undone I should have been without her."

In Eighteen Hundred Forty-two, Darwin and his wife moved to the village of Down, County of Kent. The place where they lived was a rambling old stone house with ample garden. The country was rough and unbroken, and one might have imagined he was a thousand miles from London, instead of twenty.

There were no aristocratic neighbors, no society to speak of. With the plain farmers and simple folk of

the village Darwin was on good terms. He became treasurer of the local improvement society, and thereby was serenaded once a year by a brass band. We hear of the good old village rector once saying, " Mr. Darwin knows botany better than anybody this side of Kew; and although I am sorry to say that he seldom goes to church, yet he is a good neighbor and almost a model citizen." Together the clergyman and his neighbor discussed the merits of climbing roses, morning-glories and sweet-peas. Darwin met all and every one on terms of absolute equality, and never forced his scientific hypotheses upon any one. In fact, no one in the village imagined this quiet country gentleman in the dusty gray clothes that matched his full iron-gray beard was destined for a place in Westminster Abbey—no, not even himself!

Darwin's father, seeing that the Government had recognized him, and that all the scientific societies of London were quite willing to do as much, settled on him an allowance that was ample for his simple wants

On the death of Doctor Darwin, Charles became possessed of an inheritance that brought him a yearly income of a little over five hundred pounds. Children came to bless this happy household—seven in all. With these Darwin was both comrade and teacher. Two hours a day were sacred to science, but outside of this time the children made the study their own,

and littered the place with their collections gathered on heath and dale.

The recognition of the " holy time " was strong in the minds of the children, so no prohibitions were needed. One daughter has written in familiar way of once wanting to go into her father's study for a forgotten pair of scissors. It was the " holy time," and she thought she could not wait, so she took off her shoes and entered in stocking feet, hoping to be unobserved. Her father was working at his microscope: he saw her, reached out one arm as she passed, drew her to him and kissed her forehead. The little girl never again trespassed—how could she, with the father that gave her only love! That there was no sternness in this recognition of the value of the working hours is further indicated in that little Francis, aged six, once put his head in the door and offered the father a sixpence if he would come out and play in the garden.

For several years Darwin was village magistrate. Most of the cases brought before him were either for poaching or drunkenness. " He always seemed to be trying to find an excuse for the prisoner, and usually succeeded," says his son.

One time, when a prosecuting attorney complained because he had discharged a prisoner, Darwin, who might have fined the impudent attorney for contempt of court, merely said: " Why, he 's as good as we are. If tempted in the same way I am sure that I would

have done as he has done. We can't blame a man for doing what he has to do!" This was poor reasoning from a legal point of view. Darwin afterward admitted that he did n't hear much of the evidence, as his mind was full of orchids, but the fellow looked sorry, and he really could n't punish anybody who had simply made a mistake. The local legal lights gradually lost faith in Magistrate Darwin's peculiar brand of justice; he had n't much respect for law, and once when a lawyer cited him the criminal code he said, "Tut, tut, that was made a hundred years ago!" Then he fined the man five shillings, and paid the fine himself, when he should have sent him to the workhouse for six months

# CHARLES DARWIN

THE men who have most benefited the world have, almost without exception, been looked down upon by the priestly class. That is to say, the men upon whose tombs society now carves the word Savior were outcasts and criminals in their day.

In a society where the priest is regarded as the mouthpiece of divinity, and therefore the highest type of man, the artist, the inventor, the discoverer, the genius, the man of truth, has always been regarded as a criminal. Society advances as it doubts the priest, distrusts his oracles, and loses faith in his institution.

In the priest, at first, was deposited all human knowledge, and what he did not know he pretended to know. He was the guardian of mind and morals, and the cure of souls. To question him was to die here and be damned for eternity.

The problem of civilization has been to get the truth past the preacher to the people: he has forever barred and blocked the way, and until he was shorn of his temporal power there was no hope. The prisons were first made for those who doubted the priest; behind and beneath every episcopal residence were dungeons; the ferocious and delicate tortures that reached every physical and mental nerve were his. His anathemas and curses were always quickly turned upon the strong men of mountain or sea who dared live natural lives, said what they thought was truth, or did what they

deemed was right. Science is a search for truth, but theology is a clutch for power.

Nothing is so distasteful to a priest as freedom: a happy, exuberant, fearless, self-sufficient and radiant man he both feared and abhorred. A free soul was regarded by the Church as one to be dealt with. The priest has ever put a premium on pretense and hypocrisy. Nothing recommended a man more than humility and the acknowledgment that he was a worm of the dust. The ability to do and dare was in itself considered a proof of depravity.

The education of the young has been monopolized by priests in order to perpetuate the fallacies of theology, and all endeavor to put education on a footing of usefulness and utility has been fought inch by inch.

Andrew D. White, in his book, "The Warfare of Science and Religion," has calmly and without heat sketched the war that Science has had to make to reach the light. Slowly, stubbornly, insolently, theology has fought Truth step by step—but always retreating, taking refuge first behind one subterfuge, then another. When an alleged fact was found to be a fallacy, we were told it was not a literal fact, simply a spiritual one. All of theology's weapons have been taken from her and placed in the Museum of Horrors—all save one, namely, social ostracism. And this consists in a refusal to invite Science to indulge in cream-puffs.

We smile, knowing that the man who now successfully

defies theology is the only one she really, yet secretly, admires. If he does not run after her, she holds true the poetic unities by running after him. Mankind is emancipated (or partially so).

Darwin's fame rests, for the most part, on two books, " The Origin of Species " and " The Descent of Man." ¶ Yet before these were published he had issued " A Journal of Research into Geology and Natural History," " The Zoology of the Voyage of the ' Beagle,' " " A Treatise on Coral Reefs, Volcanic Islands, Geological Observations," and " A Monograph of the Cirripedia." Had Darwin died before " The Origin of Species " was published, he would have been famous among scientific men, although it was the abuse of theologians on the publication of " The Origin of Species " that really made him world-famous.

Alfred Russel Wallace, Darwin's chief competitor said that " A Monograph on the Cirripedia " is enough upon which to found a deathless reputation. Darwin was equally eminent in Geology, Botany and Zoology. ¶ On November Twenty-fourth, Eighteen Hundred Fifty-nine, was published " The Origin of Species." Murray had hesitated about accepting the work, but on the earnest solicitation of Sir Charles Lyell, who gave his personal guarantee to the publisher against loss, quite unknown to Darwin, twelve hundred copies of the book were printed. The edition was sold in one day, and who was surprised most, the author or the

publisher, it is difficult to say. ¶ Up to this time theology had stood solidly on the biblical assertion that mankind had sprung from one man and one woman, and that in the beginning every species was fixed and immutable. Aristotle, three hundred years before Christ, had suggested that, by cross-fertilization and change of environment, new species had been and were being evoked. But the Church had declared Aristotle a heathen, and in every school and college of Christendom it was taught that the world and everything in it was created in six days of twenty-four hours each, and that this occurred four thousand and four years before Christ, on May Tenth.

Those who doubted or disputed this statement had no standing in society, and in truth, until the beginning of the Nineteenth Century, were in actual danger of death—heresy and treason being usually regarded as the same thing.

Erasmus Darwin had taught that species were not immutable, but his words were so veiled in the language of poesy that they naturally went unchallenged. But now the grandson of Doctor Erasmus Darwin came forward with the net result of thirty years' continuous work. "The Origin of Species" did not attack any one's religious belief—in fact, in it the biblical account of Creation is not once referred to. It was a calm, judicial record of close study and observation, that seemed to prove that life began in very lowly forms,

and that it has constantly ascended and differentiated, new forms and new species being continually created, and that the work of creation still goes on.

In the preface to "The Origin of Species" Darwin gives Alfred Russel Wallace credit for coming to the same conclusion as himself, and states that both had been at work on the same idea for more than a score of years, but each working separately, unknown to the other.

Andrew D. White says that the publication of Charles Darwin's book was like plowing into an ant-hill. The theologians, rudely awakened from comfort and repose, swarmed out angry, wrathful and confused. The air was charged with challenges; and soggy sermons, books, pamphlets, brochures and reviews, all were flying at the head of poor Darwin. The questions that he had anticipated and answered at great length were flung off by men who had neither read his book nor expected an answer. The idea that man had evolved from a lower form of animal especially was considered immensely funny, and jokes about "monkey ancestry" came from almost every pulpit, convulsing the pews with laughter.

In passing, it may be well to note that Darwin nowhere says that man descended from a monkey. He does, however, affirm his belief that they had a common ancestor. One branch of the family took to the plains, and evolved into men, and the other branch remained

in the woods and are monkeys still. The expression, "the missing link," is nowhere used by Darwin—that was a creation of one of his critics.

Wilberforce, Bishop of Oxford, summed up the argument against Darwinism in the "Quarterly Review," by declaring that "Darwin was guilty of an attempt to limit the power of God"; that his book "contradicts the Bible"; that "it dishonors Nature." And in a speech before the British Association for the Advancement of Science, where Darwin was not present, the Bishop repeated his assertions, and turning to Huxley, asked if he were really descended from a monkey, and if so, was it on his father's or his mother's side!

Huxley sat silent, refusing to reply, but the audience began to clamor, and Huxley slowly arose, and calmly but forcibly said: "I assert, and I repeat, that a man has no reason to be ashamed of having an ape for his grandfather. If there were an ancestor whom I should feel shame in recalling, it would be a man, a man of restless and versatile intellect, who, not content with success in his own sphere of activity, plunges into scientific questions with which he has no real acquaintance, only to obscure them by an aimless rhetoric, and distract the attention of his hearers from the real point at issue by eloquent digression and a skilful appeal to religious prejudices." Captain Fitz-Roy, who was present at this meeting, was also called for.

He was now Admiral Fitz-Roy, and felt compelled

to uphold his employer, the State, so he upheld the State Religion and backed up the Bishop of Oxford in his emptiness. " I often had occasion on board the 'Beagle' to reprove Mr. Darwin for his disbelief in the First Chapter of Genesis," solemnly said the Admiral. And Francis Darwin writes it down without comment, probably to show how much the Volunteer Naturalist was helped, aided and inspired by the Captain of the Expedition.

But the reply of Huxley was a shot heard round the world, and for the most part the echo was passed along by the enemy.

Huxley had insulted the Church, they said, and the adherents of the Mosaic account took the attitude of outraged and injured innocence.

As for himself, Darwin said nothing. He ceased to attend the meetings of the scientific societies, for fear that he would be drawn into debate, and while he felt a sincere gratitude for Huxley's friendship, he deprecated the stern rebuke to the Bishop of Oxford. " It will arouse the opposition to greater unreason," he said. And this was exactly what happened.

Even the English Catholics took sides with Wilberforce, the Protestant, and Cardinal Manning organized a society " to fight this new, so-called science that declares there is no God and that Adam was an ape."

¶ Even the Non-Conformists and Jews came in, and

there was the very peculiar spectacle witnessed of the Church of England, the Non-Conformists, the Catholics and the Jews aroused and standing as one man, against one quiet villager who remained at home and said," If my book can not stand the bombardment, why then it deserves to go down and to be forgotten."

Spurgeon declared that Darwinism was more dangerous than open and avowed infidelity, since " the one motive of the whole book is to dethrone God."

Rabbi Hirschberg wrote, " Darwin's volume is plausible to the unthinking person; but a deeper insight shows a mephitic desire to overthrow the Mosaic books and to bury Judaism under a mass of fanciful rubbish."

¶ In America Darwin had no more persistent critic than the Reverend DeWitt Talmage. For ten years Doctor Talmage scarcely preached a sermon without making reference to " monkey ancestry " and " baboon unbelievers."

The New York " Christian Advocate " declared, " Darwin is endeavoring to becloud and befog the whole question of truth, and his book will be of short life."

An eminent Catholic physician and writer, Doctor Constantine James, wrote a book of three hundred pages called " Darwinism, or the Man-Ape." A copy of Doctor James' book being sent to Pope Pius the Ninth, the Pope acknowledged it in a personal letter, thanking the author for his " masterly refutations of

the vagaries of this man Darwin, wherein the Creator is left out of all things and man proclaims himself independent, his own king, his own priest, his own God—then degrading man to the level of the brute by declaring he had the same origin, and this origin was lifeless matter. Could folly and pride go further than to degrade Science into a vehicle for throwing contumely and disrespect on our holy religion!"

This makes rather interesting reading now for those who believe in the infallibility of popes. So well did Doctor James' book sell, coupled with the approbation of the Pope, that as late as Eighteen Hundred Eighty-two a new and enlarged edition made its appearance, and the author was made a member of the Papal Order of Saint Sylvester. It is quite needless to add that those who read Doctor James' book refuting Darwin had never read Darwin, since "The Origin of Species" was placed on the "Index Expurgatorius" in Eighteen Hundred Sixty. Some years after, when it was discovered that Darwin had written other books, these were likewise honored.

The book on barnacles being called to the attention of the Censor, that worthy exclaimed, "Some new heresy, I dare say—put it on the 'Index!'" And it was so done.

The success of Doctor James' book reveals the popularity of the form of reasoning that digests the refutation first, and the original proposition not at all.

# CHARLES DARWIN

In Eighteen Hundred Seventy-five, Gladstone in an address at Liverpool said, " Upon the ground of what is called evolution, God is relieved from the labor of creation and of governing the universe." ¶ Herbert Spencer called Gladstone's attention to the fact that Sir Isaac Newton, with his law of gravitation and the physical science of astronomy, was open to the same charge

Gladstone then took refuge in the " Contemporary Review," and retreated in a cloud of words that had nothing to do with the subject.

Thomas Carlyle, who has facetiously been called a liberal thinker, had not the patience to discuss Darwin's book seriously, but grew red in the face and hissed in falsetto when it was even mentioned. He wrote of Darwin as " the apostle of dirt," and said, " He thinks his grandfather was a chimpanzee, and I suppose he is right—leastwise, I am not the one to deprive him of the honor."

Scathing criticisms were uttered on Darwin's ideas, both on the platform and in print, by Doctor Noah Porter of Yale, Doctor Hodge of Princeton, and Doctor Tayler Lewis of Union College. Agassiz, the man who was regarded as the foremost scientist in America, thought he had to choose between orthodoxy and Darwinism, and he chose orthodoxy. His gifted son tried to rescue his father from the grip of prejudice, and later endeavored to free his name from the charge

that he could not change his mind, but alas! Louis Agassiz's words were expressed in print, and widely circulated

There were two men in America whose names stand out like beacon-lights because they had the courage to speak up loud and clear for Charles Darwin while the pack was baying the loudest. These men were Doctor Asa Gray, who influenced the Appletons to publish an American edition of " The Origin of Species," and Professor Edward L. Youmans, who gave up his own brilliant lecture work in order that he might stand by Darwin, Spencer, Huxley and Wallace.

For the man who was known as " a Darwinian " there was no place in the American Lyceum. Shut out from addressing the public by word of mouth, Youmans founded a magazine that he might express himself, and he fired a monthly broadside from his " Popular Science Monthly." And it is good to remember that the faith of Youmans was not without its reward. He lived to see his periodical grow from a confessed failure —a bill of expense that took his monthly salary to maintain—to a paying property that made its owner passing rich.

Gray, too, outlived the charge of infidelity, and was not forced to resign his position as Professor at Harvard, as was freely prophesied he would.

As for Darwin himself, he stood the storm of misunderstanding and abuse without scorn or resentment

" Truth must fight its way," he said; " and this gauntlet of criticism is all for the best. What is true in my book will survive, and that which is error will be blown away as chaff." He was neither exalted by praise nor cast down by censure. For Huxley, Lyell, Hooker, Spencer, Wallace and Asa Gray he had a great and profound love—what they said affected him deeply, and their steadfast kindness at times touched him to tears. For the great, seething, outside world that had not thought along abstruse scientific lines, and could not, he cared little &

" How can we expect them to see as we do," he wrote to Gray; " it has taken me thirty years of toil and research to come to these conclusions. To have the unthinking masses accept all that I say would be calamity: this opposition is a winnowing process, and all a part of the Law of Evolution that works for good."

# CHARLES DARWIN

FOR forty years Darwin lived in the same house at Down, in the same quiet, simple way. Here he lived and worked, and the world gradually came to him, figuratively and literally. Gradually it dawned upon the theologians that a God who could set in motion natural laws that worked with beneficent and absolute regularity was just as great as if He had made everything at once and then stopped.

The miracle of evolution is just as sublime as the miracle of Adam's deep sleep and the making of a woman out of a man's rib. The faith of the scientist who sees order, regularity and unfailing law is quite as great as that of a preacher who believes everything he reads in a book. The scientist is a man with faith, plus.

When Darwin died, in Eighteen Hundred Eighty-two, Darwinism and infidelity were words no longer synonymous

The discrepancies and inconsistencies of the theories of Darwin were seen by him as by his critics, and he was ever willing to admit the doubt. None of his disciples was as ready to modify his opinions as he. " We must beware of making science dogmatic," he once said to Haeckel.

And at another time he said, " I would feel I had gone too far were it not for Wallace, who came to the same conclusions, quite independently of me." Darwin's mind was simple and childlike. He was a student,

always learning, and no one was too mean or too poor for him to learn from. The patience, persistency and untiring industry of the man, combined with the daring imagination that saw the thing clearly long before he could prove it, and the gentle forbearance in the presence of unkindness and misunderstanding, won the love of a nation.

He wished to be buried in the churchyard at Down, but at his death, by universal acclaim, the gates of Westminster swung wide to receive the dust of the man whom bishops, clergy and laymen alike had reviled. Darwin had won, not alone because he was right, but because his was a truly great and loving soul—a soul without the least resentment.

Archdeacon Farrar, quoting Huxley, said, " I would rather be Darwin and be right than be Premier of England—we have had and will have many Premiers, but the world will never have another Darwin."

# HAECKEL

Nothing seems to me better adapted than this monistic perspective to give us the proper standard and the broad outlook which we need in the solution of the vast enigmas that surround us. It not only clearly indicates the true place of a man in Nature, but it dissipates the prevalent illusion of man's supreme importance and arrogance with which he sets himself apart from the illimitable universe, and exalts himself to the position of its most valuable element. This boundless presumption of conceited man has misled him into making himself "the image of God," claiming an "eternal life" for his ephemeral personality, and imagining that he possesses unlimited "freedom of will." The ridiculous imperial folly of Caligula is but a special form of man's arrogant assumption of divinity. Only when we have abandoned this untenable illusion, and taken up the correct cosmological perspective, can we hope to reach the solution of the Riddle of the Universe.

*—Haeckel*

ERNST HAECKEL

# HAECKEL

THERE was a man, once upon a day, who lived in East Aurora and kept a store. He sold everything from cough-syrup to blue ribbon; and some of the things he sold on time to philosophers who sat on nail-kegs every evening, and settled the coal strike. ¶ And in due course of time the storekeeper compromised with his creditors, at twenty-nine cents on the dollar.

Some say the man went busted a-purpose to quit business and get out of East Aurora. And he himself generally allowed the opinion to gain ground in later years that he had planned his life throughout, from start to finish, thus proving the supremacy of the will. Yet others there be, and men of worth and social standing in the village—known for miles up the creek as persons of probity—who claim that it was too much confidence in the Genus Smart-Setter, and trotting horses at the County Fairs, that made it possible for our friend to avail himself of the Bankruptcy Act. Still others, too inert to follow the winding ways of a strange career and give reasons, dispose of the matter by simply saying, "Providence!"—rolling their eyes upward, then walking out, leaving the wordy contestants humiliated and undone.

It will be seen that I am interested in this chapter of Ancient History: and in truth, I myself occasionally ornament the nail-kegs. I claim it was neither Providence nor astute planning that mapped this man's course, but Providence, Planning and Luck; and I silence the adversary, for the time, by citing these facts:

Very shortly after Providence and the Sheriff of Erie County—whose name, by the way, was Grover Cleveland—had disposed of the East Aurora grocery, our friend met a man in Buffalo who had a sweeping scar on his chin, a wonderful secret, and nothing else worth mentioning

This man secured his assets in Germany; he got them while attending the University of Jena. The secret was gotten by an understanding with a professor; the scar was received through a misunderstanding with a student. The secret was a plan by which you could make glucose from corn. In Germany it was only a laboratory experiment, because there was no corn in Europe to speak of.

Here we had corn to burn, since in that very year the farmers of Iowa were using corn for their fuel. Glucose is the active saccharine principle in maize, but it does not become active until the corn is treated chemically in a certain way, just as honey is not honey until a bee puts it through his Maeterlinck laboratory.

Glucose is a food; it can be used for all purposes where

sugar is used—in degree, at least. ¶ And every living person on earth uses sugar as food every day! Our ex-grocer knew all about Hambletonian Ten and Dexter; but dextrine, dextrose and glucose were out of his class. Yet he realized that if sugar could be made from corn, there was a fortune in it for somebody. Opportunity, we are told, knocks once at each man's door. Our David Harum was forty, past, and he had often thought Opportunity was tapping, but when he opened wide the door, darkness there, and nothing more! Opportunity had knocked, but was too timid to stay. This time, he heard the knock, and when he opened up the door, Opportunity made a rush for him, grabbed him by the collar—catch-as-catch-can—in a grip he could not shake off.

Mr. Harum examined as best he could the glucose the German student had made, and then he watched the whole experiment worked out over again. What the particular ingredients were, was still a secret. The man would not sell out; he wanted to organize a manufactory and take a certain per cent of the profits. David had saved a thousand dollars out of the wreck at East Aurora; but he knew if he could show certain men that the scheme was genuine, he would be able to raise more. ¶ Five thousand dollars was secured. But the men who advanced the four thousand dollars demanded an insurance-policy on the life of the German chemist. This appealed to our David Harum as an excellent

plan: if the man who held the secret should die, all would be lost save honor. They insured the life of the chemist for twenty thousand dollars. In a month after, he was killed in a railroad wreck on a Sunday School excursion. And the moral is—but never mind that now.

¶ The twenty thousand dollars' insurance was paid to David Harum. He repaid his friends immediately their four thousand dollars, and reserved for himself, very properly, the sixteen thousand dollars to cover expenses. He then started for Jena.

Arriving there, he found that the making of glucose was no special secret, and to manufacture it on a large scale was simply a matter of evolving the right kind of system and a plant. He hired a young German chemist, who had just graduated, for a matter of, say, a thousand dollars a year and expenses, and the two started back for America.

From this arose the Glucose Industry in the United States. In ten years' time twelve million dollars was invested in the business; and in Nineteen Hundred Three more than a hundred million dollars was invested. Our East Aurora hero sold out his interests, in Eighteen Hundred Ninety, for some such bagatelle as thirteen million dollars.

The young German student is now back at the Jena university, taking a post-graduate course in chemistry—the first one is still dead.

# HAECKEL

I AM told that there be folks who pooh-pooh college training and sneeze on mention of a University degree. Usually these good people have no University degrees, but have been greatly helped by those who have.

Our David Harums are not college-bred—a statement which I trust will go unchallenged.

The true type of German student is made in Germany, and when taken out of his native environment, often evolves into something less beautiful.

His lack of worldly ambition is his chief claim to immortality. His wants are few; he rises early and works late; he is most practical in his own particular specialty, but often most impractical outside of it; he is plodding, patient, painstaking, and will follow a microbe you can not see, as Thompson-Seton's hunter followed the famous Kootenay ram.

This simple reverence for the truth—this passion for an idea—this desire to know—these things have given to the world some of its richest treasures. We are aware of what the Rockfellers have done, but we seldom stop to think of the unknown laboratory students, who made possible such vast and far-reaching institutions as the Standard Oil Company, the Carborundum Company, the Amalgamated Copper Company, and the various beet-sugar factories, that give work to thousands, and lift whole counties, and even some States, from penury to plenty.

# HAECKEL

Germany honors her scholars; and one of the strongest instincts of her national life is her search for genius. Initiative is originality in motion. Originality is too rare to flout and scout. Not all originality is good, but all good things, so far as humanity is concerned, were once original. That is to say, they were the work of Genius

Germany's sympathy for the best in thought has occasionally been broken in upon by pigmy rulers, who, for the moment, had a giant's power, so it seems hardly possible that a government which encouraged Goethe should have banished Wagner. The greatness of Kant was largely owing to the fact that he was set apart by Frederick and made free to do his work; and at this time, not another monarchy in the world would have had the insight to keep its coarse hands off this little man with the big head and the brain of a prophet. ¶ And as Kant was the greatest and most original thinker of his time, so today does a German University house the world's greatest living scientist. Ernst Haeckel has been Professor of Natural History at Jena for forty-two years. All the efforts of various other Universities to lure him away have failed. He even declined to listen to the siren song of Major Pond, and only smiled at the big baits dangled on long poles from Cook County, Illinois

"I have everything I want, everything I can use is right here; why should I think of uprooting my life?"

he asked. And yet, Jena, there in the shadow of the Thuringian Mountains, is only a little town of less than ten thousand inhabitants.

In Nineteen Hundred Three, there were five hundred pupils registered at Jena, as against four thousand at Harvard, five thousand at Ann Arbor, and nearly the same at Lincoln, Nebraska.

It will not do to assume that those who graduate at big colleges are big men, any more than to imagine that folks who reside in big towns are bigger than those who live in little villages. Perhaps the greatest men have come from the small colleges: I believe the small colleges admit this.

And surely there is plenty of good argument handy, in way of proof; for while Harvard has her Barrett Wendell, with his caveat on clearness, force and elegance; and Ann Arbor has Cicero Trueblood, Professor of Oratory, whose official duty it is to formulate the College Yell; yet Amherst, with her scant five hundred pupils, has Professor David P. Todd, the greatest astronomer of the New World. I really wonder sometimes what a University that stands in fear of Triggsology would do with Professor Ernst Haeckel, whose disregard for tradition is very decidedly Ingersollian! The actual fact is, Ernst Haeckel, the world's greatest thinker, belongs in the little town of Jena, in Germany.

At the village of Coniston, you see the little hall where Ruskin read the best things he ever wrote, to a dozen

or two people. ¶ At Hammersmith, the limit of a William Morris audience was about a hundred. At Jena, Ernst Haeckel sits secure in his little lecture-hall, and speaks or reads to fifty or sixty students, but the printed word goes to millions, so his thoughts here expressed in Jena are shots heard round the world. ¶ American pedagogic institutions are mendicant—they depend upon private charity and are endowed by pious pirates and beneficent buccaneers. The individuals who made these institutions possible very naturally have a controlling voice in their management. The colleges in America that are not supported by direct mendicancy depend upon the dole of the legislator, and woe betide the pedagogic principal who offends the orthodox vote. His supplies are cut short, and purse-strings pucker until his voice moderates to a monotone and he dilutes his views to a dull neutral tint. I do not know a University in the United States that would not place Ernst Haeckel on half-rations, and make him fight for his life, or else he would be discharged and be reduced to the sad necessity of tilting windmills in popular lecture courses for the edification of agrarians. The German Government seeks to make men free. It even gives them the privilege of being absurd; for pioneers sometimes take the wrong track. We do not scout Columbus because his domestic voyages were failures; nor because he sought one thing and found another, and died without knowing the difference

# HAECKEL

Haeckel's wants are all supplied; what he needs in the way of apparatus or material is his for the asking; he travels at will the round world over; visions of old age and yawning almshouses are not for him. He owns himself—he does what he wishes, he says what he thinks, and neither priest nor politician dare cry, hist! So we get the paradox: the only perfect freedom is to be found in a monarchy. "A Republic," says Schopenhauer, " is a land that is ruled by the many—that is to say, by the incompetent." But Schopenhauer, of course, knew nothing of the American primary, devised by altruistic Hibernians for the purpose of thwarting the incompetent many.

# HAECKEL

ERNST HAECKEL was born in Eighteen Hundred Thirty-four, hence he is just seventy-seven years old at this writing. His parents were plain people, neither rich nor poor—and of such is the Kingdom of Heaven. The greatest error one can make in life is not to be well born; failing in this, a man struggles through life under an awful handicap

Haeckel formed the habit of steady, systematic work in youth, and untiring effort has been the rule of his life. Man was made to be well, and he was made to work. It is only work—which is the constant effort to retain equilibrium—that makes life endurable. So we find Haeckel now, at near fourscore years, a model of manly vigor, with all the eager, curious, receptive qualities of youth—a happy man, but one who knows that happiness lies on the way to Heaven, and not in arriving there and sitting down to enjoy it.

Ernst Haeckel gathers his manna fresh every day. I believe Haeckel enjoys his pipe and mug after the day's work is done; but for stimulants in a general sense, he has no use. In his book on Ceylon, he attributes his escape from the jungle fever, from which most of his party suffered, to the fact that he never used strong drink, and ate sparingly.

He is jealous of the sunshine—a great walker—works daily with hoe and spade in his garden; and breathes deeply, pounding on his chest, when going from his

house to the college, in a way that causes considerable amusement among the fledglings. Tall, spare rather than stout, bronzed, active, wearing shoes with thick soles, plain gray clothes, often accompanied by a half-dozen young men, he is a common figure on the roads that wind out of Jena, and lose themselves amid the mountains ☙ ☙

The distinguishing feature of the man is his animation. He is full of good cheer, and acts as if he were expecting to discover something wonderful very soon.

To find the balance between play and work has been the aim of his life; and surely, he has pretty nearly discovered it.

Once when a caller asked him what he considered the greatest achievement of his life, he took out of his pocket a leather case containing a bronze medal, and proudly passed it around.

This medal was presented to him in the year Eighteen Hundred Fifty-nine, in token of a running high jump—the world's record at the time, or not, as the case may be. Haeckel is essentially an out-of-door man, as opposed to the philosopher who works in a stuffy room, and grows round-shouldered over his microscope. " I may entrust laboratory analyses to others, but there is one thing I will never let another do for me, and that is take my daily walk a-field," he once said.

While lecturing he sits at a table and simply talks in a very informal way; often purposely arousing a

discussion, or awakening a sleepy student with a question. Yet on occasion he can speak to a multitude, and, like Huxley, rise to the occasion. Oratory, however, he considers rather dangerous, as the speaker is usually influenced by the opinions of the audience, and is apt to grow more emphatic than exact—to generate more heat than light.

The comparison of Haeckel with Huxley is not out of place. He has been called the Huxley of Germany, just as Huxley was called the Haeckel of England. In temperament, they were much alike; although Haeckel perhaps does not use quite so much aqua fortis in his ink. Yet I can well imagine that if he were at a convention where the Bishop of Oxford would level at him a few theological spitballs, he would answer, unerringly, with a sling and a few smooth pebbles from the brook. And possibly, knowing himself, this is why he keeps out of society, and avoids all public gatherings where pseudo-science is exploited.

There is a superstition that really great men are quite oblivious of their greatness, and that the pride of achievement is not among their assets. Nothing could be wider of the mark. When Ernst Haeckel was asked, "Who is your favorite author?" he very promptly answered, "Ernst Haeckel."

His study is a big square room on the top floor of one of the college buildings; and in this room is a bookcase extending from ceiling to floor, given up to his own works.

Copies of every edition and of all translations are here. ¶ And in a special case are the original manuscripts, solidly bound in boards, as carefully preserved as were the "literary remains" of William Morris, guarded with the instincts of a bibliophile.

Of the size of this Haeckel collection one can make a guess when it is stated that the man has written and published over fifty different books. These vary in size from simple lectures to volumes of a thousand pages. His work entitled, "The Natural History of Creation," has been translated into twelve languages, and has gone through fifteen editions in Germany, and about half as many in England.

The last book issued by Professor Haeckel was that intensely interesting essay, "The Riddle of the Universe," which was written in Eighteen Hundred Ninety-nine, in two months' time, during his summer vacation. He gave it out that he had gone to Italy, denied himself to all visitors who knew that he had not, and answered no letters. He reached his study every morning at six o'clock and locked himself in, and there he remained until eight o'clock at night. At noon one of his children brought him his lunch.

Unlike Herbert Spencer, whose later writings were all dictated—and very slowly and painstakingly at that—Haeckel writes with his own hand, and when the fit is on, he turns off manuscript at the rate of from two to four thousand words a day. In writing "The Riddle of

the Universe," he took no exercise save to go up on the roof, breathing deeply and pounding his chest, varying the pounding by reaching his arms above his head and stretching. However, after a few weeks the villagers and visitors got to looking for him with opera-glasses; and he ceased going on the roof, taking his calisthenics at the open window.

This exercise of reaching and stretching until you lift yourself on tiptoe, he goes out of his way to recommend in his book on "Development," wherein he says, "There is a tendency as the years pass for the internal organs to drop, but the individual who will daily go through the motion of reaching for fruit on limbs of trees that are above his head, standing on tiptoe and slowly stretching up and up, occasionally throwing his head back and looking straight up, will of necessity breathe deeply, exercise the diaphragm, and I believe in most cases will ward off diseases and keep old age awaiting for long."

Here is a little commonsense advice given by a physician who is also a great scientist. To try it will cost you nothing—no apparatus is required—just throw open the window and reach up and up and up, first with one arm, then the other, and then both arms. "The person who does this daily for five minutes as a habit will probably have no need of a physician," adds Haeckel, and with this sage remark he dismisses the subject, branching off into an earnest talk on radiolaria.

# HAECKEL

HAECKEL was educated for a physician and began his career by practising medicine. But his heart was not really in the work; he soon arrived at the very sane conclusion that constant dwelling on the pathological was not worth while. " Hereafter I 'll devote my time to the normal, not the abnormal and distempered. The sick should learn to keep well," he wrote a friend.

And again, " If an individual is so lacking in will that he can not provide for himself, then his dissolution is no calamity to either himself, the State or the race." This was written in his twenties, and seems to sound rather sophomorish, but the idea of the boy is still with the old man, for in " The Riddle of the Universe " he says, " The final effect upon the race by the preservation of the unfit, through increased skill in surgery and medicine, is not yet known." In another place he throws in a side remark, thus: " Our almshouses, homes for imbeciles, and asylums where the hopelessly insane often outlive their keepers, may be a mistake, save as these things minister to the spirit of altruism which prompts their support. Let a wiser generation answer! "

¶ Doubtless Haeckel could make a good argument in favor of the doctors if he wished, but probably if asked to do so his answer would paraphrase Robert Ingersoll, when that gentleman was taken to task for unfairness towards Moses, " Young man, you seem to forget that I am not the attorney of Moses—don't worry, there are

more than ten millions of men looking after his case." Ernst Haeckel is not the attorney for either the doctors or the clergy.

It was Darwin and "The Origin of Species" that tipped the beam for Haeckel in favor of science. Very shortly after Darwin's great book was issued, in the year Eighteen Hundred Fifty-nine, a chance copy of the work fell into the hands of our young physician. He read and spoke English, and in a general way was interested in biology.

As he read of Darwin's observations and experiments the heavens seemed to open before him.

Things he had vaguely felt, Darwin stated, and thoughts that had been his, Darwin expressed. "I might have written much of this book, myself," he said.

The love of Nature had been upon the young man almost from his babyhood. All children love flowers and mix easily with the wonderful things that are found in woods and fields. At twelve years of age Ernst had formed a goodly herbarium, and was making a collection of bugs, and not knowing their names or even that they had names, he began naming them himself. Later it came to him with a shock of surprise and disappointment that the bugs and beetles had already had the attention of scholars. But he got even by declaring that he would hunt out some of the tiny things the scholars had overlooked and classify them. Every man imagines himself the first man, and to

think that he is Adam and that he has to go forth, get acquainted with things and name them, reveals the true bent of the scientist.

Doctor Haeckel was ripe for Darwin's book. He was looking for it, and it took only a slight jolt to dislodge him from the medical profession and allow the Law of Affinity to do the rest.

Wallace had written Darwin's book under another name, and if these men had not written it, Haeckel surely would, for it was all packed away in his heart and head. As Darwin had studied and classified the Cirripedia, so would he write an essay on Rhizopods. Luck was with him—luck is always with the man of purpose. He had an opportunity to travel through Italy as medical caretaker to a rich invalid. Sickness surely has its uses; and rich invalids are not wholly a mistake on the part of Setebos. Haeckel secured the leisure and the opportunity to round up his Rhizopods.

¶ He presented the work to the University of Jena, because this was the University that Goethe attended, and the gods of Haeckel were three—Goethe, Darwin and Johannes Muller.

Muller was instructor in Zoology at Berlin, a man quite of the Agassiz type who made himself beloved by the boys because he was what he was—a boy in heart, with a man's head and the soul of a saint. Some one said of Muller, " To him every look into a microscope was a service to God." In his reverent attitude he was

like Linnæus, who fell on his knees on first beholding the English gorse in full flower, and thanked Heaven that such a moment of divine joy was his.

Muller was a Jena man, too, and he gave Haeckel letters to the bigwigs. The wise men of Jena discovered that there was merit in Haeckel's discoveries.

Original investigators are rare—most of us write about the men who have done things, or else we tell about what they have done, and so we reach greatness by hitching our wagon to a star. For the essay on Rhizopods, Haeckel was made Professor Extraordinary of the University of Jena. This was in Eighteen Hundred Sixty-two; Haeckel was then twenty-eight years old; there he is today, after a service of forty-nine years.

# HAECKEL

HAECKEL is married, with a big brood of children and grandchildren about him. Some of his own children and the grandchildren are about the same age, for Haeckel has two broods, having had two wives, both of whom sympathized with the Teddine philosophy.

With the whole household, including servants, the great scientist is on terms of absolute good camaraderie. The youngsters ride on his back; the older girls decorate him with garlands; the boys work with him in the garden, or together they tramp the fields and climb the hills

But when it comes to study he goes to his own room in the Zoology Building, enters in and locks the door. When he travels he travels alone, without companion or secretary. Travel to him means intense work; and intense work means to him intense pleasure. Solitude seems necessary to close, consecutive thinking; and in the solitude of travel, through jungle, forest, crowded city, or across wide oceans, Haeckel finds his true and best self. Then it is that he puts his soul in touch with the Universal and realizes most fully Goethe's oft-repeated dictum, "All is one." And, indeed, to Goethe must be given the credit of preparing the mind of Haeckel for Darwinism.

In his book, "The Freedom and Science of Teaching," Haeckel applies the poetic monistic ideas of Goethe to biology and then to sociology. "All is one." And

this oneness that everywhere exists is simply a differentiation of the original single cell.

The evolution of the cell mirrors the evolution of the species: the evolution of the individual mirrors the evolution of the race.

This law, expressed by Goethe, is the controlling shibboleth in all Haeckel's philosophy.

In embryology he has proved it to the satisfaction of the scientific world. When he applies it to sociology our Bellamys are looking backward to Sir Thomas More, and expect a sudden transformation to a Utopia, not unlike the change which the good old preachers used to tell us we would experience " in the twinkling of an eye."

Haeckel builds on Darwin and shows that as the Cirripedia which makes the bottom of the ocean, the coral " insect " which rears dangerous reefs and even mountain-ranges, and Rhizopods that make the chalk cliffs possible, did not change the earth's crust in the twinkling of an eye, so neither can the efforts of man instantly change the social condition. Souls do not make lightning changes. Karl Marx thought society would change in the twinkling of a ballot, but he was not a Monist, and therefore did not realize that humanity is a solidarity of souls, evolved from very lowly forms and still slowly ascending.

And the beauty of it is that the Marxians are helping the race to ascend, by supplying it an Ideal, even if

they fail utterly to work their lightning change. In the end there is no defeat for any man or any thing. When men deserve the Ideal they will get it. So long as they prefer beer, tobacco, brawls and slums, these things will be supplied. When they get enough of these, something better will be evolved. The stupidity of George the Third was a necessary factor in the evolution of freedom for America. All is one; all is Good; and all is God.

The Marxians will eventually win, but by Fabian methods, and Socialism will come under another name. As opposed to Herbert Spencer, Haeckel does not admit the Unknowable, although, of course, he realizes the unknown. No man ever had a fuller faith, and if there is any such thing as a glorious deathbed it must come to men of this type who believe not only that all is well for themselves, but for every one else. How a deathbed could be " glorious " for a man who had perfect faith in his own salvation and an equally perfect faith in the damnation of most everybody else, is difficult to understand ☙ ☙

A true Monist would rather be in Hell asking for water than in Heaven denying it.

He loves humanity because he is Humanity, and he loves God because he is God. As a single drop of water mirrors the globe, so does a single man mirror the race. And the evolution, biological and sociological, of the man mirrors the evolution of the species. ¶ When one

once grasps the beauty and splendor of the monistic idea, how mean and small become all those little, fearsome " schemes of salvation," whereby men were to be separated and impassable gulfs fixed between them. Those who fix gulfs here and now are hotly intent on showing that God will fix gulfs hereafter; thus we see how man is continually creating God in his own image. ¶ His idea of God's justice is always built on his own; and as usually our deities are more or less inherited, heirlooms of the past, we see that it is not at all strange that men should be better than their religion. They drag their dead creeds behind them like a stagecoach, with preachers and priests on top; kings and nobles inside; and coffins full of past sins in the boot. A man is always better than his creed—unless he makes his creed new every day. These hand-me-down religions seldom fit, and professional theology, it seems to me, is mostly a dealing in ol' clo'.

# HAECKEL

IN the month of September, Nineteen Hundred Four, Haeckel was a delegate to the Freethinkers' Congress at Rome. To hold such a convention in the Eternal City, right under the eaves of the Vatican, was surely a trifle "indelicate," to use the words of the Pope. And it was no wonder that at the close of the Congress the Pope at once ordered a sacred housecleaning, a divine fumigation

Forty years ago he would have acted before the Congress convened, and not afterward. Special mass was held in every one of the Catholic Churches in Rome, "partially to atone for the insult done to Almighty God."

Over three thousand delegates were present at the Congress, every civilized country being represented. ¶ A committee was named to decorate the statue of Bruno that stands on the spot where he was burned for declaring that the earth revolved, and that the stars were not God's jewels hung in the sky each night by angels.

On this occasion, Haeckel said:

"This Congress is historic. It marks a white milepost in the onward and upward march of Freedom.

"We have met in Rome not accidentally or yet incidentally, but purposely. We have met here to show the world that times have changed, that the earth revolves, and to prove to ourselves in an impressive

and undeniable way that the power of superstition is crippled, and at last Science and Free Speech need no longer cringe and crawl. We respect the Church for what she is, but our manhood must now realize that it is no longer the slave and tool of entrenched force and power that abrogates to itself the name of religion."

¶ The Haeckel attitude of mind is essentially one of faith—Haeckel's hope for the race is sublime. There are several things we do not know, but we may know some time, just as men know things that children do not

And yet we are only children in the kindergarten of God. And this garden where we work and play is our own. The boy of ten, or even the man of sixty, may never know, but there will come men greater than these and they will understand. The Monist, the man who believes in the One—the All—is essentially religious

Haeckel has chosen this word Monism, as opposed to theism, deism, materialism, spiritism.

Doctor Paul Carus is today the ablest American exponent of Monism, and to him it is a positive religion. If Monism could make men of the superb mental type of Paul Carus, well might we place the subject on a compulsory basis and introduce it into our public schools. But Haeckel and Carus believe quite as much in freedom as in Monism. All violence of direction is contrary to growth, and delays evolution just that

much. ¶ The One of which we are part and particle—single cells, if you please—is constantly working for its own good. We advance individually as we lie low in the Lord's hand and allow ourselves to be receivers and conveyors of the Divine Will.

And we ourselves are the Divine Will. The contemplation of this divinity excites the religious emotions of awe, veneration, wonder and of worship. It is a world of correlation. The All is right here. There is no outside force or energy; no god or supreme being that looks on, interferes, dictates and decides. To admit that there is an outside power, something uncorrelated, is to invite fear, apprehension, uncertainty and terror. This undissolved residuum is the nest-egg of superstition. The man who believes that God is the Whole, and that every man is a necessary part of the Whole, has no need to placate or please an intangible Something. All he has to do is to be true to his own nature, to live his own life, to understand himself. This takes us back to the Socratic maxim, "Know Thyself." No man ever expressed one phase of Monism so well and beautifully as Emerson has in his "Essay on Compensation." This intelligence in which we are bathed rights every wrong, equalizes every injustice, balances every perversion, punishes the wrong and rewards the right. The Universe is self-lubricating and automatic. The Greeks clearly beheld the sublime truths of Compensation when they pictured Nemesis. It is absurd to

punish—leave it to Nemesis—she never forgets—nothing can escape her.

Our duties lie in service to ourselves, and we best serve self by serving humanity. This is the only religion that pays compound interest to both borrower and lender. Worship Humanity and you honor yourself.

And the world has ever dimly perceived this, for history honors no men save those who have given their lives that others might live. The saviors of the world are only those who loved Humanity more than all else. All men who live honest lives are saviors—they live that others may live.

He that saveth his life shall lose it.

We grow through radiation, not by absorption or annexation. To him that hath shall be given. We keep things by giving them to others. The dead carry in their clenched hands only that which they have given away; and the living carry only the love in their hearts which they have bestowed on others.

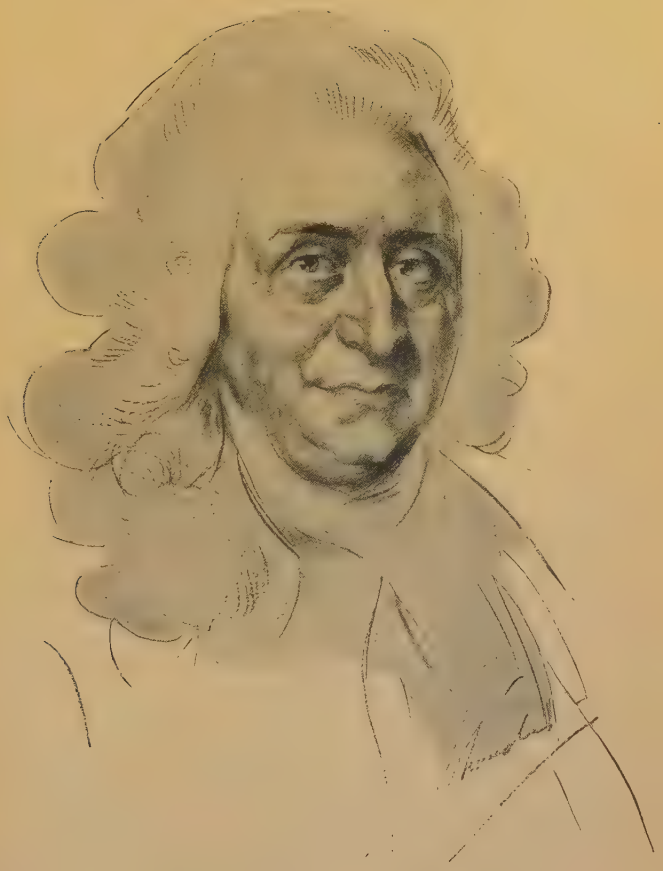
" I and my Father are one "—the thought is old, but to prove it from the so-called material world through the study of biology has been the life-work of Ernst Haeckel

Undaunted we press ever on.

# LINNAEUS

When a man of genius is in full swing, never contradict him, set him straight or try to reason with him. Give him a free field. A listener is sure to get a greater quantity of good, no matter how mixed, than if the man is thwarted. Let Pegasus bolt—he will bring you up in a place you know nothing about!

—*Linnaeus*



CARL VON LINNAEUS

# LINNAEUS

UT of the mist and fog of time, the name of Aristotle looms up large. It was more than twenty-three hundred years ago that Aristotle lived. He might have lived yesterday, so distinctively modern was he in his method and manner of thought. Aristotle was the world's first scientist. He sought to sift the false from the true—to arrange, classify and systematize.

Aristotle instituted the first zoological garden that history mentions, barring that of Noah. He formed the first herbarium, and made a geological collection that prophesied for Hugh Miller the testimony of the rocks. Very much of our scientific terminology goes back to Aristotle

Aristotle was born in the mountains of Macedonia. His father was a doctor and belonged to the retinue of King Amyntas. The King had a son named Philip, who was about the same age as Aristotle.

Some years later, Philip had a son named Alexander, who was somewhat unruly, and Philip sent a Macedonian cry over to Aristotle, and Aristotle harkened to the call for help and went over and took charge of the education of Alexander.

The science of medicine in Aristotle's boyhood was

the science of simples. In surgery the world has progressed, but in medicine, doctors have progressed most, by consigning to the grave, that tells no tales, the deadly materia medica.

In Aristotle's childhood, when his father was both guide and physician to the king, on hunting trips through the mountains, the doctor taught the boys to recognize sarsaparilla, stramonium, hemlock, hellebore, sassafras and mandrake. Then Aristotle made a list of all the plants he knew and wrote down the supposed properties of each.

Before Aristotle was half-grown, both his father and mother died, and he was cared for by a Mr. and Mrs. Proxenus. This worthy couple would never have been known to the world were it not for the fact that they ministered to this orphan boy. Long years afterward he wrote a poem to their memory, and paid them such a tender, human compliment that their names have been woven into the very fabric of letters. "They loved each other, and still had love enough left for me," he says. And we can only guess whether this man and his wife with hearts illumined by divine passion, the only thing that yet gladdens the world, ever imagined that they were supplying an atmosphere in which would bud and blossom one of the greatest intellects the world has ever known.

It was through the help of Proxenus that Aristotle was enabled to go to Athens and attend the School of

Oratory, of which Plato was dean. ¶ The fine, receptive spirit of this slender youth evidently brought out from Plato's heart the best that was packed away there.

Aristotle was soon the star scholar. To get much out of school you have to take much with you when you go there. In one particular, especially, Aristotle, the country boy from Macedonia, brought much to Plato —and this was the scientific spirit. Plato's bent was philosophy, poetry, rhetoric—he was an artist in expression

" Know thyself," said Socrates, the teacher of Plato. " Be thyself," said Plato. " Know the world of Nature, of which you are a part," said Aristotle; " and you will be yourself and know yourself without thought or effort. The things you see, you are."

Twenty-three years Aristotle and Plato were together, and when they separated it was on the relative value of science and poetry. " Science is vital," said Aristotle; " but poetry and rhetoric are incidental." It was a little like the classic argument still carried on in all publishing-houses, as to which is the greater: the man who writes the text or the man who illustrates it.

One is almost tempted to think that Plato's finest product was Aristotle, just as Sir Humphry Davy's greatest discovery was Michael Faraday. One fine, earnest, receptive pupil is about all any teacher should expect in a lifetime, but Plato had at least two, Aristotle and Theophrastus. And Theophrastus dated his birth

from the day he met Aristotle. ¶ Theo-Phrastus means God's speech, or one who speaks divinely. The boy's real name was Ferguson. But the name given by Aristotle, who always had a passion for naming things, stuck, and the world knows this superbly great man as Theophrastus.

Botany dates from Theophrastus. And Theophrastus it was who wrote that greatest of acknowledgments, when, in dedicating one of his books, he expressed his indebtedness in these words: " To Aristotle, the inspirer of all I am or hope to be."

# LINNAEUS

AFTER Theophrastus' death the science of botany slept for three hundred years. During this interval was played in Palestine that immortal drama which so profoundly influenced the world. Twenty-three years after the birth of Christ, Pliny, the Naturalist, was born.

He was the uncle of his nephew, and it is probable that the younger man would have been swallowed in oblivion, just as the body of the older one was covered by the eager ashes of Vesuvius, were it not for the fact that Pliny the Elder had made the name deathless. ¶ Pliny the Younger was about such a man as Richard Le Gallienne; Pliny the Elder was like Thomas A. Edison

At twenty-two, Pliny the Elder was a Captain in the Roman Army doing service in Germany. Here he made memoranda of the trees, shrubs and flowers he saw, and compared them with similar objects he knew at home. " Animal and vegetable life change as you go North and South; from this I assume that life is largely a matter of temperature and moisture." Thus wrote this barbaric Roman soldier, who thereby proved he was not so much of a barbarian after all. When he was twenty-five, his command was transferred to Africa, and here, in the moments stolen from sleep, he wrote a work in three volumes on education, entitled, " Studiosus."

In writing the book he got an education—to find out

about a thing, write a book on it. Pliny returned to Rome and began the practise of law, and developed into a special pleader of marked power. He still held his commission in the army, and was sent on various diplomatic errands to Spain, Africa, Germany, Gaul and Greece. If you want things done, call on a busy man: the man of leisure has no spare time.

Pliny's jottings on natural history very soon resolved themselves into the most ambitious plan, which up to that time had not been attempted by man—he would write out and sum up all human knowledge.

The next man to try the same thing was Alexander von Humboldt. We now have Pliny's " Natural History " in thirty-seven volumes. His other forty volumes are lost. The first volume of the " Natural History," which was written last, gives a list of the authors consulted. Aristotle and Theophrastus take the places of honor, and then follow a score of names of men whose works have perished and whom we know mostly through what Pliny says about them. So not only does Pliny write science as he saw it, but introduces us into a select circle of authors whom otherwise we would not know. We have the world of Nature, but we would not have this world of thinkers, were it not for Pliny.

Pliny even quotes Sappho, who loved and sung, and whose poems reached us only through scattered quotations, as if Emerson's works should perish and we would revive him through a file of " The Philistine "

magazine. Pliny and Paul were contemporaries. Pliny lived at Rome when Paul lived there in his own hired house, but Pliny never mentioned him, and probably never heard of him.

One man was interested in this world, the other in the next.

Pliny begins his great work with a plagiarism on Lyman Abbott, "There is but one God." The idea that there were many arose out of the thought that because there were many things, there must be special gods to look after them: gods of the harvest, gods of the household, gods of the rain, etc.

There is but one God, says Pliny, and this God manifests Himself in Nature. Nature and Nature's work are one. This world and all other worlds we see or can think of are parts of Nature. If there are other Universes, they are natural; that is to say, a part of Nature. God rules them all according to laws which He Himself can not violate. It is vain to supplicate Him, and absurd to worship Him, for to do these things is to degrade Him with the thought that He is like us. The assumption that God is very much like us is not complimentary to God ☙ ☙

God can not do an unnatural or a supernatural thing. He can not kill Himself. He can not make the greater less than the less. He can not make twice ten anything else than twenty.

He can not make a stick that has but one end. He can

not make the past, future. He can not make one who has lived never to have lived. He can not make the mortal, immortal; nor the immortal, mortal. He can change the form of things, but He can not abolish a thing. Pliny preaches the Unity of the Universe and his religion is the religion of Humanity.

Pliny says:

" We can not injure God, but we can injure man. And as man is part of Nature or God, the only way to serve God is to benefit man. If we love God, the way to reveal that love is in our conduct toward our fellows. ¶ Pliny was close upon the Law of the Correlation of Forces, and he almost got a glimpse of the Law of Attraction or Gravitation. He sensed these things, but could not prove them. Pliny touched life at an immense number of points. What he saw, he knew, but when he took things on the word of Marco Polo and Sir John Mandeville (for these gentlemen adventurers have always lived), he fell into curious errors. For instance, he tells of horses in Africa that have wings, and when hard pressed, fly like birds; of ostriches that give milk, and of elephants that live on land or sea equally well; of mines where gold is found in solid masses and the natives dig into it for diamonds.

But outside of these little lapses, Pliny writes sanely and well. Book Two treats of the crust of the earth, of earthquakes, meteors, volcanoes (these had a strange fascination for him), islands and upheavals. ¶ Books

Three and Four relate of geography and give amusing information about the shape of the continents and the form of the earth. Then comes a book on man, his evolution and physical qualities, with a history of the races ☙ ☙

Next is a book on Zoology, with a resume of all that was written by Aristotle, and with many corroborations of Thompson-Seton and Rudyard Kipling. Facts from the "Jungle Book" are here recited at length. Book Nine is on marine life—sponges, shells and coral insects. Book Ten treats of birds, and carries the subject further than it had ever been taken before, even if it does at times contradict John Burroughs. Book Eleven is on insects, bugs and beetles, and tells, among other things, of bats that make fires in caves to keep themselves warm. Book Twelve is on trees, their varieties, height, age, growth, qualities and distribution. Book Thirteen treats of fruits, juices, gums, wax, saps and perfumes. Book Fourteen is on grapes and the making of wine, with a description of the process and the various kinds of wine, their effects on the human system, with a goodly temperance lesson backed up by incidents and examples. ¶ Book Fifteen treats of pomegranates, apples, plums, peaches, figs and various other luscious fruits, and shows much intimate and valuable knowledge. And so the list runs down through, treating at great length of bees, fishes, woods, iron, lead, copper, gold, marble, fluids, gases, rivers, swamps, seas, and a thousand and

one things that were familiar to this marvelous man. But of all subjects, Pliny shows a much greater love for botany than for anything else. Plants, flowers, vines, trees and mosses interest him always, and he breaks off other subjects to tell of some flower that he has just discovered ☙ ☙

Pliny had command of the Roman fleet that was anchored in the bay off Pompeii, when that city was destroyed in the year Seventy-nine. Bulwer-Lytton tells the story, with probably a close regard for the facts. The sailors, obeying Pliny's orders, did their utmost to save human life, and rescued hundreds. Pliny himself made various trips in a small boat from the ship to the beach. He was safely on board the flagship, and orders had been given to weigh anchor, when the commander decided to make one more visit to the perishing city to see if he could not rescue a few more, and also to get a closer view of Nature in a tantrum. ¶ He rowed away into the fog. The sailors waited for their beloved commander, but waited in vain. He had ventured too close to the flowing lava, and was suffocated by the fumes, a victim to his love for humanity and his desire for knowledge. So died Pliny the Elder, aged but fifty-six years.

# LINNAEUS

ALL children are zoologists, but a botanist appears upon the earth only at rare intervals. ¶ A Botanist is born—not made. From the time of Pliny, botany performed the Rip Van Winkle act until John Ray, the son of a blacksmith, appeared upon the scene in England. In the meantime, Leonardo had classified the rocks, recorded the birds, counted the animals and written a book of three thousand pages on the horse. Leonardo dissected many plants, but later fell back upon the rose for decorative purposes.

John Ray was born in Sixteen Hundred Twenty-eight near Braintree in Essex. Now, as to genius—no blacksmith-shop is safe from it. We know where to find ginseng, but genius is the secret of God.

A blacksmith's helper by day, this aproned lad with sooty face dreamed dreams. Evenings he studied Greek with the village parson. They read Aristotle and Theophrastus. ¶ Have a care there, you Macedonian miscreant, dead two thousand years, you are turning this boy's head! ¶ John Ray would be a botanist as great as Aristotle, and he would speak divinely, just as did Theophrastus. It is all a matter of desire! Young Ray became a Minor Fellow of Trinity College, Cambridge; then a Major Fellow; then he took the Master's degree; next he became lecturer on Greek; and insisted that Aristotle was the greatest man the world had ever seen, except none, and the Dean raised an eyebrow. ¶ The professor

of mathematics resigned and Ray took his place; next he became Junior Dean, and then College Steward; and according to the custom of the times he used to preach in the chapel. One of his sermons was from the text, " Consider the lilies of the field." Another sermon that brought him more notoriety than fame was on the subject, " God in Creation," wherein he argued that to find God we should look for Him more in the world of Nature and not so much in books.

Matters were getting strained. Ray was asked to subscribe to the Act of Uniformity, which was a promise that he would never preach anything that was not prescribed by the Church. Ray demurred, and begged that he be allowed to go free and preach anything he thought was truth—new truth might come to him! This shows the absurdity of Ray. He was asked to reconsider or resign. He resigned—resigned the year that Sir Isaac Newton entered.

Fortunately, one particular pupil followed him, not that he loved college less, but that he loved Ray more. This pupil was Francis Willughby. Through the bounty of this pupil we get the scientist—otherwise, Ray would surely have been starved into subjection. Willughby took Ray to the home of his parents, who were rich people. ¶ Ray undertook the education of young Willughby, very much as Aristotle took charge of Alexander. Willughby and Ray traveled, studied, observed and wrote. They went to Spain, took trips to France, Italy

and Switzerland, and journeyed to Scotland. Willughby devoted his life to Ornithology and Ichthyology and won a deathless place in science.

Ray specialized on botany, and did a work in classification never done before. He made a catalog of the flora of England that wrung even from Cambridge a compliment—they offered him the degree of LL. D. Ray quietly declined it, saying he was only a simple countryman, and honors or titles would be a disadvantage, tending to separate him from the plain people with whom he worked. However, the Royal Society elected him a member, and he accepted the honor, that he might put the results of his work on record. His paper on the circulation of sap in trees was read before the Royal Society, on the request of Newton. Due credit was given Harvey for his discovery of the circulation of the blood; but Ray made the fine point that man was brother to the tree, and his life was derived from the same Source.

When Willughby died, in Sixteen Hundred Seventy-two, he left Ray a yearly income of three hundred dollars. Doctor Johnson told Boswell that Ray had a collection of twenty thousand English bugs. Our botanical terminology comes more from John Ray than from any other man. Ray adopted wherever possible the names given by Aristotle, so loyal, loving and true was he to the Master. Ray died in Seventeen Hundred Five, aged seventy-six.

# LINNAEUS

TWO years after the death of John Ray, in Seventeen Hundred Seven, was born a baby who was destined to find biology a chaos, and leave it a cosmos.

Linnæus did for botany what Galileo had done for astronomy. John Ray was only a John the Baptist. ¶ Carl von Linne, or Carolus Linnæus as he preferred to be called, was born in an obscure village in the Province of Smaland, Sweden. His father was a clergyman, passing rich on forty pounds a year. His mother was only eighteen years old when she bore him, and his father had just turned twenty-one. It was a poor parish, and one of the deacons explained that they could not afford a real preacher; so they hired a boy. ¶ Carl tells in his journal, of remembering how, when he was but four years old, his father would lead his congregation out through the woods and, all seated on the grass, the father would tell the people about the plants and herbs and how to distinguish them. ¶ Back of the parsonage there was a goodly garden, where the young pastor and his wife worked many happy hours. When Carl was eight years of age, a corner of this garden was set apart for his very own.

He pressed into his service several children of the neighborhood, and they carried flat stones from the near-by brook to wall in this miniature farm—this botanical garden.

The child that has n't a flowerbed or a garden of its

ownest own is being cheated out of its birthright ❧ The evolution of the child mirrors the evolution of the race. And as the race has passed through the savage, pastoral and agricultural stages, so should the child. As a people we are now in the commercial or competitive stage, but we are slowly emerging out of this into the age of co-operation or enlightened self-interest.

It is only a very great man—one with a prophetic vision—who can see beyond the stage in which he is. ¶ The stage we are in seems the best and the final one—otherwise, we would not be in it. But to skip any of these stages in the education or evolution of the individual seems a sore mistake. Children hedged and protected from digging in the dirt develop into "third rounders," as our theosophic friends would say, that is, educated non-comps—vast top-head and small cerebellum—people who can explain the unknowable, but who do not pay cash. Third rounders all—fit only for the melting-pot!

A tramp is one who has fallen a victim of arrested development and never emerged from the nomadic stage; an artistic dilettante is one who has jumped the round where boys dig in the dirt and has evolved into a missnancy.

Young Carl Linnæus skipped no round in his evolution. He began as a savage, robbing birds' nests, chasing butterflies, capturing bees, bugs and beetles. He trained goats to drive, hitched up a calf, fenced his little farm,

and planted it with strange and curious crops. ¶ Clergymen once were the only schoolteachers, and in Sweden, when Linnæus was a boy, there was a plan of farming children out among preachers that they might be educated. Possibly this plan of having some one besides the parents teach the lessons is good—I can not say. But young Carl did not succeed—save in disturbing the peace among the households of the half-dozen clergymen who in turn had him.

The boy evidently was a handsome fellow, a typical Swede, with hair as fair as the sunshine, blue eyes, and a pink face that set off the fair hair and made him look like a Circassian.

He had energy plus, and the way he cluttered up the parsonages where he lodged was a distraction to good housewives: birds' nests, feathers, skins, claws, fungi, leaves, flowers, roots, stalks, rocks, sticks and stones—and when one meddled with his treasures, there was trouble. And there was always trouble; for the boy possessed a temper, and usually had it right with him. ¶ The intent of the parents was that Carl should become a clergyman, but his distaste for theology did not go unexpressed. So perverse and persistent were his inclinations that they preyed on the mind of his father, who quoted King Lear and said, "How sharper than a serpent's tooth it is to have a thankless child!" ¶ His troubles weighed so upon the good clergyman that his nerves became affected and he went to the

neighboring town of Wexio to consult Doctor Rothman, a famed medical expert.

The good clergyman, in the course of his conversation with the doctor, told of his mortification on account of the dulness and perversity of his son.

Doctor Rothman listened in patience and came to the conclusion that young Mr. Linnæus was a good boy who did the wrong thing. All energy is God's, but it may be misdirected. A boy not good enough for a preacher might make a good doctor—an excess of virtue is not required in the recipe for a physician.

¶ " I 'll cure you, by taking charge of your boy," said Rothman; " you want to make a clergyman of the youth: I 'll let him be just what he wants to be, a naturalist and a physician." And it was so.

# LINNAEUS

THE year spent by Linnæus under the roof of Doctor Rothman was a pivotal point in his life. He was eighteen years old. The contempt of Rothman for the refinements of education appealed to the young man. Rothman was blunt, direct, and to the point: he had a theory that people grew by doing what they wanted to do, not by resisting their impulses.

He was both friend and comrade to the boy. They rode together, dissected animals and plants, and the young man assisted in operations. Linnæus had the run of the Doctor's library, and without knowing it, was mastering physiology.

" I would adopt him as my son," said Rothman; " but I love him so much that I am going to separate him from me. My roots have struck deep in the soil: I am like the human trees told of by Dante; but the boy can go on!"

And so Rothman sent him along to the University of Lund, with letters to another doctor still more cranky than himself. This man was Doctor Kilian Stobæus, a medical professor, physician to the king, and a naturalist of note. Stobæus had a mixed-up museum of minerals, birds, fishes and plants.

Everybody for a hundred miles who had a curious thing in the way of natural history sent it to Stobæus. Into this medley of strange and curious things Linnæus was plunged with orders to " straighten it up." There

was a German student also living with the doctor, working for his board. Linnæus took the lead and soon had the young German helping him catalog the curios. ¶ The spirit of Ray had gotten abroad in Germany, and Ray's books had been translated and were being used in many of the German schools. Linnæus made a bargain with the German student that they should speak only German—he wanted to find what was locked up in those German books on botany.

Stobæus was lame and had but one eye, so he used to call on the boys to help him, not only to hitch up his horse, but to write his prescriptions. Linnæus wrote very badly, and was chided because he did not improve his penmanship, for it seems that in the olden times physicians wrote legibly. Linnæus resented the rebuke, and was shown the door. He was gone a week, when Stobæus sent for him, much to his relief. This little comedy was played several times during the year, through what Linnæus afterward acknowledged as his fault. One would hardly think that the man who on first seeing the English gorse in full bloom fell on his knees, burst into tears of joy, and thanked God that he had lived to see this day, would have had a fiery temper. Then further, the gentle, spiritual qualities that Linnæus in his later life developed give one the idea that he was always of a gentle nature.

In indexing the museum of Doctor Stobæus, Linnæus found his bent. " I will never be a doctor," he said;

" but I can beat the world on making a catalog." ❧ And thus it was: his genius lay in classification. " He indexed and catalogued the world," a great writer has said ❧ ❧

After a year at the University of Lund, with more learned by working for his board than at school, there was a visit from Doctor Rothman, who had just dropped in to see his old friend Stobæus. The fact was, Rothman cared a deal more for Linnæus than he did for Stobæus. " Weeds develop into flowers by transplanting only," said Rothman to Linnæus. " You need a different soil —get out of here before you get pot-bound."

" But about Cyclops? " asked Linnæus.

" Let Cyclops go to the devil! " It was no use to ask permission of Stobæus. Linnæus was so valuable that Stobæus would not spare him.

So Linnæus packed up and departed between the dawn and the day, leaving a letter stating he had gone to Upsala because it seemed best and begging forgiveness for such seeming ingratitude.

When Linnæus got to Upsala he found a letter from Doctor Cyclops, written in wrath, requesting him never again to show his face in Lund. Rothman also lost the friendship of Stobæus for his share in the transaction ❧ ❧

# LINNAEUS

WHEN Linnæus arrived at Upsala he had one marked distinction, according to his own account—he was the poorest student that had ever knocked at the gates of the University for admittance. Perhaps this is a mistake, for even though the young man had patched his shoes with birch bark, he was not in debt.

And the youth of twenty-one who has health, hope, ambition and animation is not to be pitied. Poverty is only for the people who think poverty.

It is five hundred English miles from Lund to Upsala. After his long, weary tramp, Linnæus sat on the edge of the hill and looked down at the scattered town of Upsala in the valley below. A stranger passing by pointed out the college buildings, where a thousand young men were being drilled and disciplined in the mysteries of learning. "Where is the Botanical Garden?" asked the newcomer.

It was pointed out to him. He gazed on the site, carefully studied the surrounding landscape, and mentally calculated where he would move the Botanical Garden as soon as he had control of it. Let us anticipate here just long enough to explain that the Upsala Botanical Garden now is where Linnæus said it should be. It is a most beautiful place, lined off with close-growing shrubbery. After traversing the winding paths, one reaches the lecture-hall, built after the Greek, with porches, peristyle and gently ascending marble steps.

On entering the building, the first object that attracts the visitor is the life-size statue of Linnæus.

To the left, a half-mile away, is the old cathedral—a place that never much interested Linnæus. But there now rests his dust, and in windows and also in storied bronze his face, form and fame endure. In the meantime, we have left the young man sitting on a boulder looking down at the town ere he goes forward to possess it

He adjusts his shoes with their gaping wounds, shakes the dust from his cap, and then takes from his pack a faded neckscarf, puts it on and he is ready.

Descending the hill he forgets his lameness, waives the stone-bruises, and walks confidently to the Botanical Garden, which he views with a critical eye. Next, he inquires for the General Superintendent who lives near. The young man presents his credentials from Rothman, who describes the youth as one who knows and loves the flowers, and who can be useful in office or garden and is not above spade and hoe. The Superintendent looks at the pink face, touched with bronze from days in the open air, notes the long yellow hair, beholds the out-of-door look of fortitude that comes from hard and plain fare, and inwardly compares these things with the lack of them in some of his students. "But this Doctor—Doctor Rothman who wrote this letter—I do not have the honor of knowing him," says the Superintendent.

"Ah, you are unfortunate," replies the youth; "he is a very great man, and I myself will vouch for him in every way." ¶ Oh! this glowing confidence of youth —before there comes a surplus of lime in the bones, or the touch of winter in the heart! The Superintendent smiled. Knock in faith and the door shall be opened— there are those whom no one can turn away. A stray bed was found in the garret for the stranger, and the next morning he was earnestly at work cataloguing the dried plants in the herbarium, a task long delayed because there was no one to do it.

# LINNAEUS

THE study of Natural History in the University of Upsala was, at this time, at a low ebb. It was like the Art Department in many of the American colleges: its existence largely confined to the school catalog. There were many weeks of biting poverty and neglect for Linnæus, but he worked away in obscurity and silence and endured, saying all the time, "The sun will come out, the sun will come out!" Doctor Olaf Rudbeck had charge of the chair of Botany, but seldom sat in it. His business was medicine. He gave no lectures, but the report was that he made his students toil at cultivating in his garden—this to open up their intellectual pores. In the course of his work, Linnæus devised a sex plan of classification, instead of the so-called natural method. He wrote out his ideas and submitted them to Rudbeck. ¶ The learned Doctor first pooh-poohed the plan, then tolerated it, and in a month claimed he had himself devised it. On the scheme being explained to others there was opposition, and Rudbeck requested Linnæus to amplify his notes into a thesis, and read it as a lecture. This was done, and so pleased was the old man that he appointed Linnæus his adjunctus. In the Spring of Seventeen Hundred Thirty, Linnæus began to give weekly lectures on some topic of Natural History. ¶ Linnæus was now fairly launched. His animation, clear thinking, handsome face and graceful ways made his lectures very popular. Science in his hands was no

longer the dull and turgid thing it had before been in the University. He would give a lecture in the hall, and then invite the audience to walk with him in the woods. He seemed to know everything: birds, beetles, bugs, beasts, trees, weeds, flowers, rocks and stones were to him familiar.

He showed his pupils things they had walked on all their lives and never seen.

The old Botanical Garden that had degenerated into a kitchen-garden for the Commons was rearranged and furnished with many specimens gathered round about.

¶ A system of exchange was carried on with other schools, and Natural History at Upsala was fast becoming a feature. Old Doctor Rudbeck hobbled around with the classes, and when Linnæus lectured sat in a front seat, applauding by rapping his cane on the floor and ejaculating words of encouragement.

Linnæus was now receiving invitations to lecture at other schools in the vicinity. He made excursions and reports on the Natural History of the country around.

The Academy of Science of Upsala now selected him to go to Lapland and explore the resources of that country, which was then little known.

The journey was to be a long and dangerous one. It meant four thousand miles of travel on foot, by sledge and on horseback, over a country that was for the most part mountainous, without roads, and peopled with semi-savages.

¶ There were two reasons why Linnæus should make the trip:

One was he had the hardihood and the fortitude to do it.

¶ And second, he was not wanted at Upsala. He was becoming too popular. One rival professor had gone so far as to prefer formal charges of scientific heresy; he also made the telling point that Linnæus was not a college graduate. The rule of the University was that no lecturer, teacher or professor should be employed who did not have a degree from some foreign University.

¶ Inquiry was made and it was found that Linnæus had left the University of Lund under a cloud. Linnæus was confronted with the charge, and declined to answer it, thus practically pleading guilty. So, to get him out of Upsala seemed a desirable thing, both to friends and to foes. His friends secured the commission for the Lapland exploration, and his enemies made no objections, merely whispering, "Good riddance!" To be twenty-four, in good health, with hair like that of General Custer, a heart to appreciate Nature, a good horse under you, and a commission from the State to do an important work, in your left-hand breast-pocket—what Heaven more complete!

A reception was tendered the young naturalist in the great hall, and he addressed the students on the necessity of doing your work as well as you can, and being kind. Before beginning his arduous and dangerous journey, Linnæus went to Lund to visit his old patron,

Doctor Stobæus. Time, the great healer, had cured the Doctor of his hate, and he now spoke of Linnæus as his best pupil. He had left hastily by the wan light of the moon, without leaving orders where his mail was to be forwarded; but now he was received as an honored guest. All the little misunderstandings they had were laughed over as jokes.

From Lund, Linnæus went to his home in Smaland to visit his parents.

It is needless to say that they were very proud of him, and the villagers turned out in great numbers to do him honor, perhaps, in their simplicity, not knowing why

# LINNAEUS

THE account of the Lapland trip by Linnæus is to be found in his book, " Lachesis Lapponica." ☙ ☙

The journey covered over four thousand miles and took from May to November, Seventeen Hundred Thirty-one. The volume is in the form of a daily journal, and is as interesting as " Robinson Crusoe." There is no night there in Summer; but for all this, Lapland is not a paradise.

It is a great stretch of desert, vast steppes and lofty mountains, with here and there fertile valleys. To be out in the wide open, with no companions but a horse and a dog, filled Linnæus' heart with a wild joy. As he went on, the road grew so rough that he had to part with the horse, which he did with a pang, but the dog kept him company.

To be educated is to liberate the mind from its trammels and fears—to set it free, new-chiseled from the rock. Linnæus reveled in the vast loneliness of the steppes and took a hearty satisfaction in the hard fare. His gun and fishing-rod stood him in good stead; there were berries at times, and edible barks and watercress, and when these failed he had a little bag of meal and dried reindeer-tongues to fall back upon.

The simplicity of his living is shown best in the fact that the expenses for the entire journey, occupying seven months, were only twenty-five pounds, or less than one hundred twenty-five dollars. The Academy

had set aside sixty pounds, and their surprise at having most of the money returned to them, instead of a demand being made for more, won them, hand and heart. He had hit the sturdy old burghers in a sensitive spot—the pocketbook—and they passed resolutions declaring him the world's greatest naturalist, and voted him a medal, to be cast at his own expense. Fame is delightful, but as collateral it does not rank high ☙ Linnæus was without funds and without occupation. He gave a course of lectures at the University on his explorations, where every seat was taken, and even the stage and windows were filled. The sprightliness, grace and intellect Linnæus brought to bear illumined his theme.

When Linnæus lectured, all classes were dismissed: none could rival him. His very excellence was his disadvantage. Jealousy was hot on his trail, for he was disturbing the balance of stupidity. A movement grew to force him from the college. Formal charges were made, and when the case came to a trial the even tenor of justice was disturbed by Linnæus making an attack on Professor Rosen, his principal enemy, with intent to kill him. Dueling has been forbidden in all the universities of Sweden since the year Sixteen Hundred Eighty-two, and the diversion replaced by quartet singing. So when Linnæus challenged his enemy to fight, and warned him he would kill him if he did n't fight, and also if he did, things were in a bad way for

Linnæus. ¶ The former charges were dropped to take up the more serious—just as when a man is believed to be guilty of murder, no mention is made of his crime of larceny.

Poor Linnæus was under the ban. The enemy had won: Linnæus must leave. But where should he go—what could he do? No college would receive him after his being compelled to leave Upsala for riot. He decided that if disgrace were to be his on account of revenge, he would accept the disgrace. He would kill Rosen on sight and then either commit suicide or accept the consequences: it was all one! And so, laying plans to waylay his victim, he fell asleep and dreamed he had done the deed.

He awoke in a sweat of horror!

He heard the officers at the door! He staggered to his feet, and was making wild plans to fight the pursuers, when it occurred to him that he had only dreamed. He sat down, faint, but mightily relieved.

Then he laughed, and it came to him that opposition was a part of the great game of life. To do a thing was to jostle others, and to jostle and be jostled was the fate of every man of power. " He that endureth unto the end shall be saved."

The world was before him—the flowers still bloomed, and plants nodded their heads in the meadows; the summer winds blew across the fields of wheat, the branches waved. He was strong—he could plant and

plow, or dig ditches, or hew lumber! ¶ Some one was hammering on the door; they had been knocking for fully five minutes—ah! There had been no murder, so surely it was not the officers.

He arose slowly and opened the door, murmuring apologies. A letter for Carolus Linnæus! The letter was from Baron Reuterholm of Dalecarlia. It contained a draft for twenty-five pounds, " as a token of good faith," and begged that Linnæus would accept charge of an expedition to survey the natural resources of Dalecarlia in the same way that he had Lapland, only with greater minuteness. Linnæus read the letter again. The draft fluttered from his fingers to the floor.

" Pick that up! " he peremptorily ordered of the messenger. He wanted to see if the other man saw it too. ¶ The other man did pick it up! Linnæus was not dreaming, then, after all!

THIS second expedition had two objects: one was the better education of Baron Reuterholm's two sons, and the other the survey. One of these sons was at the University of Upsala, and he had conceived such an admiration for Linnæus that he had written home about him. No man knows what he is doing: we succeed by the right oblique. Little did Linnæus guess that he was preparing the way for great good fortune. The second excursion was one of luxury. It lacked all the hardships of the first, and involved the management of a party. Reuterholm was a rich Jewish banker, and a man in close touch with all Swedish affairs of State. This time Linnæus was provided with ample funds.

Linnæus had a genius for system—a head for business. He classified men, and systematized his work like a general in the field. There were seven young naturalists in the party, and to each Linnæus assigned a special work, with orders to hand in a written report of progress each evening. That the "Economist" or steward of the party was an American lends an especial note of interest for us. After Dalecarlia it was to be America!

¶ In money matters he was punctilious and accurate, the result of his early training in making both ends meet. The habits of thrift, industry, energy and absolute honesty had made him a marked man—there is not so much competition along these lines.

The maps, measurements, drawings, and the exact,

short, sharp, military reports turned in at regular intervals to the Baron won that worthy absolutely. ¶ Linnæus was a businessman as well as a naturalist. It would require a book to tell of the glorious half-gypsy life of these eight young men, moving slowly through woods, across plains, over mountains and meadows, studying soil, rocks, birds, trees and flowers, collecting and making records.

Camping at night by flowing streams, awakening with the dawn and cooking breakfast by the campfire in a silence that took up their shouts of laughter in surprise, and echoed them back from the neighboring hills! At last the journey was ended. Linnæus had proved his ability to teach—his animation, good-cheer and friendly qualities brought his pupils very close to him. Reuterholm insisted that he should attach himself to the rising little college at Fahlun. There he met Doctor Moræus, a man of much worth in a scientific way. At his house Linnæus made his home. There was a daughter in the household, Sara Elizabeth, tall, slender, appreciative and studious. One of the Reuterholms had courted her, but in vain.

There were the usual results, and when Carolus and Sara Elizabeth came to Doctor Moræus hand in hand for his blessing, he granted it as good men always do. Then the Doctor gave Linnæus some good advice—go to Holland or somewhere and get a doctor's degree. The enemies at Upsala called Linnæus " the gypsy

scientist." Silence them—Linnæus was now a great man, and the world would yet acknowledge it. Sara Elizabeth agreed in all of the propositions.

Love, they say, is blind, but sometimes love is a regular telescope. This time love saw things that the learned men of Upsala failed to discover—their diagnosis was wrong. Linnæus had prepared a thesis on intermittent fever, and he was assured that if he presented this thesis at the medical school at Harderwijk, Holland, with letters from Baron Reuterholm and Doctor Moræus, it would secure him the much desired M. D. ¶ A few months, at most, would suffice. He could then return to Fahlun and take his place as a practising physician and a professor in the college, marry the lady of his choice and live happy ever afterward.

So he started away southward. In due time, he arrived at Harderwijk and read his thesis to the faculty. Instead of the callow youth, such as they usually dealt with, they found a practised speaker who defended his points with grace and confidence. The degree was at once voted, and a " cum laude " thrown in for good measure. Linnæus was asked to remain there and give a course of lectures on natural history. This he did. Before going home he thought he would take a little look in on Leyden, at that time the bookmaking and literary center of the world. At Leyden he met Gronovius, the naturalist, who asked him to remain and give lectures at the University. He did so, and incidentally

showed Gronovius the manuscript of his book on the new system of botanic classification.

Gronovius was so delighted that he insisted on having the book printed by the Plantins at his own expense. Here was a piece of good fortune Linnæus had not anticipated ❧ ❧

Linnæus now settled down to read the proofs and help the work through the presses. But he never idled an hour. ¶ He studied, wrote and lectured, and made little excursions with his friends through the fields. The book finished, he hastened to send copies back to Fahlun to Sara Elizabeth, saying he must see Amsterdam and then go to Antwerp to visit his new-found printer-friends there, and then go home!

At Amsterdam he remained a whole year, living at the house of Burman, the naturalist.

The wealthy banker, Cliffort, first among amateur botanists of his day, invited Linnæus to visit him at his country-house at Hartecamp. Here he saw the finest garden he had ever looked upon. Cliffort had copies of Linnæus' book and he now insisted that the author should remain, catalog his collection and issue the book with the help of the Plantins, all without regard to cost. It took a year to get the work out, but it yet remains one of the finest things ever attempted in a bookmaking way on the subject of botany.

About the same time, with the help of Cliffort, Linnæus published another big book of his own called,

"Fundamenta Botanica." This book was taken up at Oxford and used as a textbook, in preference to Ray.

¶ Linnæus received invitations from England and was persuaded to take a trip across to that country. He visited Oxford and London, and was received by scientific men as a conquering hero. He saw Garrick act and heard George Frederick Handel, where the crowd was so great that a notice was posted requesting gentlemen to come without swords and ladies without hoops. Handel composed an aria in his honor.

Returning to Leyden, Linnæus was urged by the municipality to remain and rearrange the public flower-gardens and catalog the rare plants at the University. This took a year, in which three more books were issued under his skilful care.

He now started for home in earnest, by way of Paris, with what a contemporary calls "a trunkful of medals."

¶ Paris, too, had honors and employment for the great botanist, but he escaped and at last reached Fahlun. He had been gone nearly four years, and during the interval had established his place in the scientific world as the first botanist of the time.

"It was love that sent me out of Sweden, and but for love I would never have returned," he wrote ☙ Linnæus and Sara Elizabeth were married June Twenty-six, Seventeen Hundred Thirty-nine.

Now the unexpected happened: Upsala petitioned Linnæus to return, and the man who headed the petition

was the one who had driven him away and who came near being killed for his pains. Linnæus and his wife went to Upsala, rich, honored, beloved.

Linnæus shifted the scientific center of gravity of all Europe to a town, practically to them obscure, a thing they themselves scarcely realized.

Henceforth, the life of Linnæus flowed forward like a great and mighty river—everything made way for him. He was invited by the King of Spain to come to that country and found a School of Science, and so lavish were the promises that they surely would have turned the head of a lesser man. Universities in many civilized countries honored themselves by giving him degrees.

¶ In Seventeen Hundred Sixty-one, the King of Sweden issued a patent of nobility in his honor, and thereafter he was Carl von Linne. In England he was known as Sir Charles Linn.

Sainte-Beuve, the eminent French critic, says that the world has produced only about half a dozen men who deserve to be placed in the first class. The elements that make up this super-superior man are high intellect, which abandons itself to the purpose in hand, careless of form and precedent; indifference to obstacles and opposition; and a joyous, sympathetic, loving spirit that runs over and inundates everything it touches, all with no special thought of personal pleasure, gratification or gain.

Linnæus seems in every way to fill the formula

THOMAS H. HUXLEY

That man, I think, has a liberal education whose body has been so trained in youth that it is the ready servant of his will, and does with ease and pleasure all that, as a mechanism, it is capable of; whose intellect is a clear, cold, logic engine, with all its parts of equal strength and in smooth running order, ready, like a steam-engine, to be turned to any kind of work and to spin the gossamers as well as forge the anchors of the mind; whose mind is stored with the knowledge of the great fundamental truths of Nature and the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions have been trained to come to heel by a vigorous will, the servant of a tender conscience; one who has learned to love all beauty, whether of Nature or of art, to hate all vileness, and to esteem others as himself.

—*Thomas Henry Huxley*

# THOMAS H. HUXLEY

HAT was a great group of thinkers to which Huxley belonged.

The Mutual Admiration Society forms the sunshine in which souls grow—great men come in groups. Sir Francis Galton says there were fourteen men in Greece in the time of Pericles who made Athens possible. A man alone is only a part of a man.

Praxiteles by himself could have done nothing. Ictinus might have drawn the plans for the Parthenon, but without Pericles the noble building would have remained forever the stuff which dreams are made of. And they do say that without Aspasia Pericles would have been a mere dreamer of dreams, and Walter Savage Landor overheard enough of their conversation to prove it.

William Morris and seven men working with him formed the Preraphaelite Brotherhood and gave the workers and doers of the world an impetus they yet feel

Cambridge and Concord had seven men who induced the Muses to come to America and take out papers.

¶ These men of the Barbizon School tinted the entire art world: Millet, Rousseau, Daubigny, Corot, Diaz.

And the people who worked a complete revolution in

the theological thought of Christendom were these: Darwin, Spencer, Mill, Tyndall, Wallace, Huxley and, yes, George Eliot, who bolstered the brain of Herbert Spencer when he was learning to think for himself ☙ When the victory had become a rout, there were many others who joined forces with the evolutionists; but at first the thinkers named above stood together and received the rather unsavory gibes and jeers of those who get their episcopopagy and science from the same source. ¶ Darwin was the only man in the group who was a university graduate, and he once said that he owed nothing to his Alma Mater, save the stimulus derived from her disapproval.

For the work these men had to do there was no precedent: no one had gone before and blazed a trail.

Learning, like capital, is timid; but ignorance coupled with a desire to know, is bold. Do I then make a plea for ignorance? Yes, most assuredly. It is just as well not to know so much, as to be a theologian and know so many things that are not true.

Learning and institutions of learning subdue men into conformity; only the man who belongs to nothing is free; and ignorance, as well as a certain indifference to what the world has said and done, is a necessary factor in the character of him who would do a great work. It was the combined ignorance and boldness of Columbus that made it possible for him to give the world a continent.

Yet the man who has not had a college training often feels he has somehow missed something valuable: there is timidity and hesitation when he is in the presence of those who have had "advantages." And Huxley felt this loss, more or less, up to his thirty-fifth year, when Fate had him cross swords with college men, and then the truth became his that if he had had the regular university training, it was quite probable that he would have accepted the doctrines the universities taught, and would then have been in the camp of the "enemy," instead of with what he called the "blessed minority." ¶ Isolation is a great aid to the thinker. Some of the best books the world has ever known were written behind prison-bars; exile has done much for literature, and a protracted sea-voyage has allowed many a good man to roam the universe in imagination. Some of Macaulay's best essays were written on board slow-going sailing-ships that were blown by vagrant winds from England to India. Darwin, Hooker and Huxley, all got their scientific baptism on board of surveying-ships, where time was plentiful and anything but fleeting, and most everything else was scarce.

Huxley was only assistant surgeon on the "Rattlesnake," and above him was a naturalist who much of his time lay in his bunk and read treatises on this and also on that. ¶ Huxley was the seventh child of a plodding schoolteacher, born on the seventh day of the week on a seventh-floor back, he used to say. His genius

for work came from his mother, a tireless, ambitious woman, who got things done while others were discussing them. " Had she been a man, she would have been leader of the Opposition in the House of Commons," her son used to say.

College education was not for that goodly brood—a living was the first thing, so after a good drilling in the three R's, Thomas Huxley was apprenticed to a pharmacist who paid him six shillings a week, a sum that the boy conscientiously gave to his mother.

Oh, if in our schoolteaching we could only teach this one thing: a great thirst for knowledge! But this desire we can not impart: it is trial, difficulty, obstacle, deprivation and persecution that make souls hunger and thirst after knowledge. Young Huxley wanted to know. His thoroughness in the drugstore won the admiration of the doctors whose prescriptions he compounded, and several of them loaned him books and took him to clinics; and at seventeen we find him with a Free Scholarship in Charing Cross Hospital, serving as nurse and assistant surgeon. Then came the appointment as assistant surgeon in the Navy, and the appointment to " H. M. S. Rattlesnake," bound on a four-year trip to the Antipodes, all quite as a matter of course.

Life is a sequence: this happened today because you did that yesterday. Tomorrow will be the result of today.¶ The general idea of evolution was strong in the mind of young Huxley. He realized that Nature

was moving, growing, changing all things. He had studied embryology, and had seen how the body of a man begins as a single minute mass of protoplasm, without organs or dimensions.

Behind the ship was his dragnet, and he worked almost constantly recording the different specimens of animal and vegetable life that he thus secured. The jellyfish attracted him most.

To the ship's naturalist, jellyfish were jellyfish, but Huxley saw that there were many kinds, distinct, separate, peculiar. He began to dissect them and thus began his book on jellyfish, just as Darwin wrote his work on barnacles.

Huxley vowed to himself that before the "Rattlesnake" got back to England he would know more about jellyfish than any other living man. That his ambition was realized no one now disputes.

Among his first discoveries, it came to him with a thrill that a certain species of jellyfish bears a very close resemblance to the human embryo at a certain stage. ¶ And he remembered the dictum of Goethe, that the growth of the individual mirrors the growth of the race. And he paraphrased it thus: "The growth of the individual mirrors the growth of the species." So filled was he with the thought that he could not sleep, so he got up and paced the deck and tried to explain his great thought to the second mate. He was getting ready for "The Origin of Species," which he once said to Darwin

he would himself have written, if Darwin had been a little more of a gentleman and had held off for a few years ❧ ❧

It was on board the " Rattlesnake " that Huxley wrote this great truth: " Nature has no designs or intentions. All that live exist only because they have adapted themselves to the hard lines that Nature has laid down. We progress as we comply."

# THOMAS H. HUXLEY

IN Australia, while waiting for his ship to locate and map a dangerous reef, Huxley went ashore, and as he playfully expressed it, "ran upon another."

The name of the most excellent young woman who was to become his wife was Henrietta Heathorn; and Julian Hawthorne has discovered that she belongs to the same good stock from whence came our Nathaniel of Salem.

It did not take the young naturalist and this stranded waif, seven thousand miles from home, long to see that they had much in common. Both were eager for truth, both had the ability to cut the introduction and reach live issues directly. "I saw you were a woman with whom only honesty would answer," he wrote her thirty years after. He was still in love with her.

Yet she was a proud soul, and no assistant surgeon on an insignificant sloop would answer her—when he got his surgeon's commission she would marry him. And it was seven years before she journeyed to England alone with that delightful object in view. He had to serve for her as Jacob did for Rachel, with this difference: Jacob loved several, but Thomas Huxley loved but one.

Huxley's wife was his companion, confidante, comrade, friend. I can not recall another so blest, in all the annals of thinking men, save John Stuart Mill. "I tell her everything I know, or guess, or imagine, so as to get

it straight in my own mind," he said to John Fiske. ¶ In that most interesting work, "Life and Lessons of Huxley," compiled by his son Leonard, are constant references and allusions to this most ideal mating. In reply to the question, Is marriage a failure? I would say, "No, provided the man marries a woman like Huxley's wife, and the woman marries a man like Huxley."

# THOMAS H. HUXLEY

THERE is a classic aphorism which runs about this way, "Knock and the world knocks with you; boost and you boost alone." Like most popular sayings this is truth turned wrong side out.

John Fiske once called Thomas Huxley an "appreciative iconoclast." That is to say, Huxley was a persistent protester (which is different from a protestant), and at the same time, he was a friend who never faltered and grew faint in time of trouble. Huxley always sniffed the battle from afar and said, Ha! Ha!

There be those who do declare that the success of Huxley was owing to his taking the tide at the flood, and riding into high favor on the Darwinian wave. To say that there would have been no Huxley had there been no Darwin would be one of those unkind cuts the cruelty of which lies in its truth.

It is equally true that if there had been no Lincoln there would have been no Grant; but Grant was a very great man just the same—so why raise the issue! Darwin summed up and made nebulæ of the truths which Huxley had, up to that time, held only in gaseous form

Darwin was born in the immortal year Eighteen Hundred Nine. Huxley was born in Eighteen Hundred Twenty-five. When "The Origin of Species" was published in Eighteen Hundred Fifty-nine, Thomas Huxley was thirty-four years old. He had made his

four years' trip around the world on the surveying-ship "Rattlesnake," just as Darwin had made his eventful voyage on the "Beagle."

These men in many ways had paralleled each other; but Darwin had sixteen years the start, and during these years he had steadily and silently worked to prove the great truth that he had sensed intuitively years before in the South Seas.

"The Origin of Species" sheds light in ten thousand ways on the fact that all life has evolved from very lowly forms and is still ascending: that species were not created by fiat, but that every species was the sure and necessary result of certain conditions.

Until "The Origin of Species" was published, and for some years afterward, the Immutability of Species was taught in all colleges, and everywhere accepted by the so-called learned men.

Goethe had somewhat dimly prophesied the discovery of the Law of Evolution, but his ideas on natural science were regarded by the schools as quite on a par with those of Dante: neither was taken seriously ✠ Darwin proved his hypothesis. Doubtless, very many schoolmen would have accepted the theory, but to admit that man was not created outright, complete, and in his present form, or superior to it, seemed to evolve a contradiction of the Mosaic account of Creation, and the breaking up of Christianity. And these things done, many thought, would entail moral chaos,

destruction of private interests and moral confusion being one and the same thing to those whose interests are involved. And so for conscience' sake, Darwin was bitterly assailed and opposed.

Opportunity, which knocks many times at each man's door, rapped hard at Huxley's door in Eighteen Hundred Sixty. It was at Oxford, at a meeting of the British Association for the Advancement of Science: "A big society with a slightly ironical name," once said Huxley. The audience was large and fashionable, delegates being present from all parts of the British Empire.

"The Origin of Species" had been published the year before, and tongues were wagging. Darwin was not present; but Huxley, who was known to be a personal friend of Darwin, was in his seat. The intent of the chairman was to keep Darwin and his pestiferous book out of all the discussions: Darwin was a good man to smother with silence.

But Samuel Wilberforce, Bishop of Oxford, in the course of a speech on another subject began to run short of material, and so switched off upon a theme which he had already exploited from the pulpit with marked effect. All public speakers carry this boiler-plate matter for use in time of stress.

The Bishop began to denounce "those enemies of the Church and Society who make covert attacks upon the Bible in the name of Science." He warmed to his theme, and by a specious series of misstatements

and various appeals to the prejudices of his audience worked the assemblage up to a high pitch of hilarity and enthusiasm. Toward the close of his speech he happened to spy Huxley seated near, and pointing a pudgy finger at him, " begged to be informed if the learned gentleman was really willing to be regarded as a descendant of a monkey? "

As the Bishop sat down, there was a wild burst of applause and much laughter, but amid the din were calls, " Huxley! Huxley! " These shouts increased as it came over the people that while the Bishop had made a great speech, he had gone a trifle too far in ridiculing a member who up to this time had been silent. The good English spirit of fair play was at work. Still Huxley sat silent. Then the enemy, thinking he was completely vanquished, took up the cry with intent to add to his discomfiture: " Huxley! Huxley! "

Slowly Huxley arose. He stood still until the last buzzing whisper had died away. When he spoke it was in so low a tone that people leaned forward to catch his words.

Huxley knew his business: his slowness to speak created an atmosphere. There was no jest in his voice or manner. The air grew tense.

His quiet reserve played itself off against the florid exuberance of the Bishop. The Bishop was not a man given to exact statements: his knowledge of science was general, not specific. ¶ Huxley demolished his

card house point by point, correcting the gross misstatements, and ending by saying that since a question of personal preferences had been brought into the discussion of a great scientific theme, he would confess that if the alternatives were a descent on the one hand from a respectable monkey, or on the other from a Bishop of the Church of England who could stoop to misrepresentation and sophistry and who had attempted in that presence to throw discredit upon a man who had given his life to the cause of science, then if forced to decide he would declare in favor of the monkey.

When Huxley took his seat, there was a silence that could be felt. Several ladies fainted. There were fears that the Bishop would reply, and to keep down such a possible unpleasant move the audience now applauded Huxley roundly, and amid the din the chairman declared the meeting adjourned.

From that time forward Huxley was famous throughout England as a man to let alone in public debate.

# THOMAS H. HUXLEY

IT is a fine thing to be a great scientist, but it is a yet finer thing to be a great man. The one element in Huxley's life that makes his character stand out clear, sharp and well defined was his steadfast devotion to truth. The only thing he feared was self-deception. When he uttered his classic cry in defense of Darwin, there was no ulterior motive in it; no thought that he was attaching himself to a popular success; no idea that he was linking his name with greatness.

What he felt was true, he uttered; and the strongest desire of his soul was that he might never compromise with the error for the sake of mental ease, or accept a belief simply because it was pleasant.

Huxley once wrote this terse sentence of Gladstone: "It is to me a serious thing that the destinies of this great country should at present be to a great extent in the hands of a man who, whatever he may be in the affairs of which I am no judge, is nothing but a copious shuffler in those that I do understand." Gladstone crossed swords with Huxley, Spencer and Robert Ingersoll, and in each case his blundering intellect looked like a raft of logs compared with a steamboat that responds to the helm. Gladstone was a man of action, and silence to such is most becoming.

He had a belief, that was enough; he should have hugged it close, and never stood up to explain it. Let us vary a simile just used: Lincoln once referred to

an opponent as being " like a certain steamboat that ran on the Sangamon. This boat had so big a whistle that when she blew it, there was n't steam enough to make her run, and when she ran she could n't whistle."

¶ Huxley, Spencer and Robert Ingersoll, all made Gladstone cut for the woods and cover his retreat in a cloud of words. Ingersoll once said that in replying to Gladstone he felt like a man who had been guilty of cruelty to children.

If one wants to see how pitifully weak Gladstone could be in an argument, let him refer to the " North American Review " for Eighteen Hundred Eighty-two.

Yet Ingersoll was surely lacking in the passion for truth that characterized Huxley. Ingersoll was always a prosecutor or a defender: the lawyer habit was strong upon him. Just a little more bias in his clay and he would have made a model bishop.

His stock of science was almost as meager as was that of Samuel Wilberforce, and he seldom hesitated to turn the laugh on an adversary, even at the expense of truth. When brought to book for his indictment of Moses without giving that great man any credit for the sublime things he did do, or making allowances for the barbaric horde with which he had to deal, Bob evaded the proposition by saying, " I am not the attorney of Moses: he has more than three million men looking after his case."

Again, in that most charming lecture on Shakespeare,

Ingersoll proves that Bacon did not write the plays, by picking out various detached passages of Bacon, which no one for a moment ever claimed revealed the genius of the man.

With equal plausibility we could prove that the author of Hamlet was a weakling, by selecting all the obscure and stupid passages, and parading these with the unexplained fact that the play opens with the spirit of a dead man coming back to earth, and a little later in the same play Shakespeare has the man who interviewed the ghost tell of " that bourne from whence no traveler returns." Even Shakespeare was not a genius all the time. And Ingersoll, the searcher for truth, borrowed from his friends, the priests, the cheerful habit of secreting the particular thing that would not help the cause in hand. But one of the best things in Ingersoll's character was that he realized his lapses and in private acknowledged them.

On reading the smooth, florid and plausible sophistry of Wilberforce, Ingersoll once said: " Be easy on Soapy Sam! A few years ago, a little shifting of base on the part of my ancestors, and I would probably have had Soapy Sam's job."

This resemblance of opposites makes a person think of that remark applied to Voltaire, " He was the father of all those who wear shovel-hats."

# THOMAS H. HUXLEY

WHEN Thomas Huxley and his wife arrived in New York in Eighteen Hundred Seventy-six, on a visit to the Centennial Exhibition, this interesting item was flashed over the country, "Huxley and his titled bride have arrived in New York on their wedding-journey."

This item caused Mr. and Mrs. Huxley—both of them royal democrats—more joy than did the most complimentary interview. At home they had left a charming little brood of seven children, three of them nearly grown-ups

Huxley sent Tyndall, who a few months before had married a daughter of Lord Hamilton, the clipping and this note: "You see how that once I am in a democratic country I am pulling all the honors I can in my own direction." The next letter the Huxleys received from Tyndall was addressed, "Sir Thomas and Lady Huxley," Huxley never stood in much awe of the nobility; he evidently felt that there was another kind of which he himself in degree was heir. Huxley never had a better friend than Sir Joseph Hooker, and we see in his letters such postscripts as this:

"Dear Sir Joseph: Do come and dine with us; it is a month since we have seen your homely old phiz." And Sir Joseph replies that he will be on hand the next Sunday evening and offers this mild suggestion, "Scientific gents as has countenances as curdles milk should not cast aspersions on men made in image of Maker."

THE wordy duel between Huxley and Gladstone prompted Toole, the great comedian, to send a box of grease-paints to Huxley with a note saying, " These are for you and Gladstone to use when you make up." It was a joke so subtle and choice that the Huxleys, always dear friends of Toole, laughed for a week.

Poor Gladstone required a diagram when he heard of the procedure; and then, not being trepanned for the pleasantry, remarked that if Toole and Huxley collaborated on the stage, it would be eminently the proper thing, and in his mind there was little choice between them, both being fine actors.

Later, we hear of Huxley saying he thought of sending the box of grease-paints to Gladstone, so the Premier could use them in making up with God; as for himself, he was like Thoreau and had never quarreled with Him.

¶ Huxley had many friendships with people seemingly outside of his own particular line of work. Henry Irving, the Reverend Doctor Parker, John Fiske and Hall Caine once met at one of Huxley's " Tall Teas," and Doctor Parker explained that he personally had no objection to visiting with sinners.

For Parker, Huxley had a great admiration and often attended the Thursday noon meeting at the Temple, " to see and hear the greatest actor in England," a compliment which Parker much appreciated, otherwise he would not have repeated it. " If I ever take to the

stage, I will play the part of Jacques or Touchstone," said Huxley.

John Fiske in his delightful essay on Huxley said that in the Huxley home there was more jest, joke and banter than in any other place in London. The air was surcharged with mirth, and puns, often very bad ones, were tossed back and forth with great recklessness. ¶ At one time John Fiske was at the Huxleys and the dual or multiple nature of man came up for discussion. Huxley spoke of how very often men who were gentle and charming in their homes were capable of great crimes, and of how, on the other hand, a man might pass in the world as a philanthropist, and yet in his household be a veritable autocrat and tyrant.

Fiske then incidentally mentioned the case of Doctors Parker and Webster of Harvard—men of intellect and worth. These men brooded over a misunderstanding that grew into a grudge and eventually hatched murder. One worthy professor killed the other, cut up the body, and tried to burn it in a chemist's retort. Only the great difficulty of reducing the human body to ashes caused the murder to out, and brought about the hanging of a scientist of note.

"Yes, I have thought of the difficulty of disposing of a dead body," said Huxley, solemnly; " and often when on the point of committing murder this was the only thing that made me hesitate!"

" Oh, Pater, we are ashamed of you," said his three

lovely daughters in concert. Huxley's ability to joke and his appreciation of the ludicrous marked him, in the mind of John Fiske, as the greatest thinker of his time. The humorist knows values, and that is why he laughs. Sensibility is, in fact, the basic element of wit.

# THOMAS H. HUXLEY

HUXLEY'S duties on the "Rattlesnake" were not in the line of science. His rank was assistant surgeon; but as sure-enough surgeons were only sent out on bigger craft, he was this ship's doctor.

With the captain's help the men were kept busy, but not too busy, and the food and regulations were such that about all Huxley had to do was to look upon his work and pronounce it good.

As a physician, Huxley practised throughout his life the science of prevention.

"With a prophetic vision, quite unconscious, my parents named me after that particular apostle I was to admire most," once said Huxley. He was a doubter by instinct, and approached the world of Nature as if nothing were known about it.

His work on the Medusa won him the recognition of the British Society, and this secured him the coveted surgeon's commission. Two tragedies confront man on his journey through life—one when he wants a thing and can not get it; the other when he gets the thing and finds he does not want it.

Having secured his surgeon's commission, Huxley felt a strong repulsion toward devoting his life to the abnormal

"I am a scientist by nature, and my business is to teach," he wrote to his affianced wife. These were wise words which he had learned from her, but which he

repeated, seemingly quite innocent of their source. We take our own wherever we find it.

Miss Heathorn admired a surgeon, but loved a scientist, and Huxley being a man was making a heroic struggle to be what the young woman most wished. Love supplies an ideal—and that is the very best thing love does, with possibly an exception or two. So behold a ship's surgeon in London, full-fledged, refusing offers of position, and even declining to take a choice of ships, for such is the perversity of things animate and inanimate that, when we do not want things, Fate brings them to us on silver platters and begs us to accept. We win by indifference as much as by desire.

" I have declined to ship on board the ' Cormorant ' as head surgeon, and have applied to the University of Toronto for a position as Professor of Natural History."

¶ And so America had Huxley flung at her head. Toronto considered, and the Canadians sat on the case, and after considerable correspondence, the vacant chair was given to Professor Baldini of the Whitby Ladies College. It was a close call for Canada! Huxley had imagined that the New World offered special advantages to a rising young person of scientific bent, but now he secured a marriage-license and settled down as lecturer at the School of Mines. A little later he began to teach at the Royal College of Surgeons, with which institution he was to be connected the rest of his life, and fill almost any chair that happened to be vacant.

From the time he was twenty-seven Huxley never had to look for work, He was known as a writer of worth, and as a lecturer his services were in demand.

He became President of the Geological and Ethnological Society; was appointed Royal Commissioner for the Advancement of Science; was a member of the London School Board; Secretary of the Royal Society; Lord Rector of the University of Aberdeen; President of the Royal Society; and refused an offer to become Custodian of the British Museum, a life position, and where he had once applied for a clerkship.

In letters to Darwin he occasionally signed his name with all titles added, thus, "Thomas Henry Huxley, M.B., M. D., Ph. D., LL. D., F. R. S. of Her Majesty's Navy."

¶ Huxley was a forceful and epigrammatic writer, and had a command of English second to no scientist that England has ever produced. He was the only one of his group who had a distinct literary style. As a speaker he was quiet, deliberate, decisive, sure; and he carried enough reserve caloric so that he made his presence felt in any assemblage before he said a word. In oratory it is personality that gives ballast.

Of his forty or so published books, "Man's Place in Nature," "Elementary Physiology" and "Classification of Animals" have been translated into many languages, and now serve as textbooks in various schools and colleges

Huxley is the founder of the so-called Agnostic School,

which has the peculiarity of not being a school. The word "agnostic" was given its vogue by Huxley. To superficial people it was quite often used synonymously with "infidel" and "freethinker," both words of reproach. To Huxley it meant simply one who did not know, but wished to learn.

The controlling impulse of Huxley's life was his absolute honesty. To pretend to believe a thing against which one's reason revolts, in order to better one's place in society, was to him the sum of all that was intellectually base

He regarded man as an undeveloped creature, and for this creature to lay the flattering unction to his soul that he was in special communication with the Infinite, and in possession of the secrets of the Creator, was something that in itself proved that man was as yet in the barbaric stage.

Said Huxley: "As to the final truths of Creation and Destiny, I am an agnostic. I do not know, hence I neither affirm nor deny."

# THOMAS H. HUXLEY

UMOR and commonsense usually go together. Huxley had a goodly stock of both. When George Eliot died, there was a very earnest but ill-directed effort made to have her body buried in Westminster Abbey. Huxley, being close to the Dean, serving with him on several municipal boards, was importuned by Spencer to use his influence toward the desired end. Huxley saw the incongruity of the situation, and in a letter that reveals the logical mind and the direct, literary, Huxley quality, he placed his gentle veto on the proposition and thus saved the "enemy" the mortification of having to do so.

Darwin is buried in Westminster Abbey, but this was not to be the final resting-place of the dust of Mill, Tyndall, Spencer, George Eliot or Huxley. These had all stood in the fore of the fight against superstition and had both given and received blows.

The Pantheon of such battle-scarred heroes was to be the hearts of those who prize above all that earth can bestow the benison of the God within. "Above all else, let me preserve my integrity of intellect," said Huxley. Here is Huxley's letter to Spencer:

4 Marlborough Place, Dec. 27, 1880

My Dear Spencer: Your telegram which reached me on Friday evening caused me great perplexity, inasmuch as I had just been talking to Morley, and agreeing with him that the proposal for a funeral in Westminster Abbey had a very questionable look to us, who desired

nothing so much as that peace and honor should attend George Eliot to her grave.

It can hardly be doubted that the proposal will be bitterly opposed, possibly (as happened in Mill's case with less provocation) with the raking up of past histories, about which the opinion even of those who have least the desire or the right to be pharisaical is strongly divided, and which had better be forgotten.

With respect to putting pressure on the Dean of Westminster, I have to consider that he has some confidence in me, and before asking him to do something for which he is pretty sure to be violently assailed, I have to ask myself whether I really think it a right thing for a man in his position to do.

Now I can not say I do. However much I may lament the circumstance, Westminster Abbey is a Christian Church and not a Pantheon, and the Dean thereof is officially a Christian priest, and we ask him to bestow exceptional Christian honors by this burial in the Abbey. George Eliot is known not only as a great writer, but as a person whose life and opinions were in notorious antagonism to Christian practise in regard to marriage, and Christian theory in regard to dogma. How am I to tell the Dean that I think he ought to read over the body of a person who did not repent of what the Church considers mortal sin, a service not one solitary proposition of which she would have accepted for truth while she was alive? How am I to urge him to do that which, if I were in his place, I should most emphatically refuse to do? You tell me that Mrs. Cross wished for the funeral in the Abbey. While I desire to entertain the greatest respect for her wishes, I am very sorry to

hear it. I do not understand the feeling which could create such a desire on any personal grounds, save those of affection, and the natural yearning to be near, even in death, those whom we have loved. And on public grounds the wish is still less intelligible to me. One can not eat one's cake and have it too. Those who elect to be free in thought and deed must not hanker after the rewards, if they are to be so called, which the world offers to those who put up with its fetters.

Thus, however I look at the proposal, it seems to me to be a profound mistake, and I can have nothing to do with it. I shall be deeply grieved if this resolution is ascribed to any other motives than those which I have set forth at greater length than I intended.

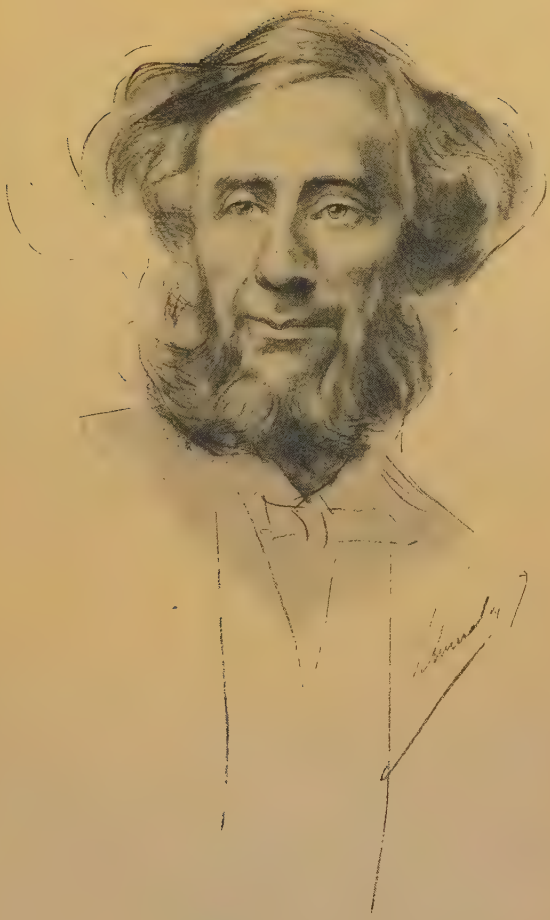
Ever yours very faithfully,

T. H. HUXLEY

# JOHN TYNDALL

In my little book on Faraday, published in Eighteen Hundred Sixty-eight, I have stated that he had but to will it to raise his income, in Eighteen Hundred Thirty-two, to five thousand pounds a year. In Eighteen Hundred Thirty-six, the sum might have been doubled. Yet this son of a blacksmith, this journeyman bookbinder, with his proud, sensitive soul, rejecting the splendid opportunities open to him—refusing even to think them splendid in presence of higher aims—cheerfully accepted from the Trinity House a pittance of two hundred pounds a year.

*—John Tyndall*



JOHN TYNDALL

# JOHN TYNDALL

YNDALL was of high descent and lowly birth. His father was a member of the Irish Constabulary, and there were intervals when the boy's mother took in washing. But back of this the constable swore i' faith, when the ale was right, that he was descended from an Irish King, and probably this is true, for most Irishmen are, and acknowledge it themselves.

The father of our Tyndall spelled his name Tyndale, and traced a direct relationship to William Tyndale, who declared he would place a copy of the English Bible in the hands of every plowboy in the British Isles, and pretty nearly made good his vow. William Tyndale paid for his privileges, however. He was arrested, given an opportunity to run away, but would n't; then he was exiled. Finally he was incarcerated in a dungeon of the Castle Vilvoorden.

His cell was beneath the level of the ground, so was cold and damp and dark. He petitioned the governor of the prison for a coat to keep him warm and a candle by which he could read. " We 'll give you both light and heat, pretty soon," was the reply.

And they did. They led Tyndale out under the blue sky and tied him to a stake set in the ground. Around

his feet they piled brush, and also all of his books and papers that they could find.

A chain was put around his neck and hooked tight to the post. Then the fagots were piled high, and the fire was lighted.

"He was not burned to death," argued one of the priests who was present; "he was not burned to death. He just drew up his feet and hanged himself in the chain, and so was choked: he was that stubborn!" The father of John Tyndall was an Orangeman and had in a glass case a bit of the flag carried at the Battle of the Boyne

It is believed, with reason, that the original flag had in it about ten thousand square yards of material. Tyndale the Orangeman was of so uncompromising a type that he occasionally arrested Catholics on general principles, like the Irishman who beat the Jew under the mistaken idea that he had something to do with crucifying "Our Savior." "But that was two thousand years ago," protested the Jew. "Niver moind; I just heard av it—take that and that!"

Zeal not wisely directed is a true Irish trait. It will not do to say that the Irish have a monopoly on stupidity, yet there have been times when I thought they nearly cornered the market. I once had charge of a gang of green Irishmen at a lumber-camp.

I started a night-school for their benefit, as their schooling had stopped at subtraction. One evening

they got it into their heads that I was an atheist. Things began to come my way. I concluded discretion was the better part of valor, and so took to the woods, literally. They followed me for a mile, and then gave up the chase. On the way home they met a man who spoke ill of me, and they fell upon him and nearly pounded his life out.

I never had to lick any of my gang: they looked after this themselves. On pay-nights they all got drunk and fell upon each other—broken noses and black eyes were quite popular. Father Driscoll used to come around nearly every month and have them all sign the pledge ☙ ☙

That story about the Irishman who ate the rind of the watermelon "and threw the inside away," is true. That is just what the Irish do. Very often they are not able to distinguish good from bad, kindness from wrong, love from hate. Ireland has all the freedom she can use or deserves, just as we all have. What would Ireland do with freedom if she had it? Hate for England keeps peace at home. Home rule would mean home rough-house—and a most beautiful argument it would be, enforced with shillalah logic. The spirit of Donnybrook Fair is there today as much as ever, and wherever you see a head, hit it, would be home rule. Donnybrook is a condition of mind.

If England really had a grudge against Ireland and wanted to get even, she could not do better than to

set her adrift. ¶But then the Irish impulsiveness sometimes leads to good, else how could we account for such men as O'Connor, Parnell, John Tyndall, Burke, Goldsmith, Sheridan, Arthur Wellesley and all the other Irish poets, orators and thinkers who have made us vibrate with our kind?

Transplanted weeds produce our finest flowers.

The parents of Tyndall were intent on giving their boy an education. And to them, the act of committing things to memory was education. William Tyndale gave the Bible to the people; John Tyndall would force it upon them. The "Book of Martyrs," the sermons of Jeremy Taylor, and the Bible, little John came to know by heart. And he grew to have a fine distaste for all. Once, when nearly a man grown, he had the temerity to argue with his father that the Bible might be better appreciated, if a penalty were not placed upon disbelief in its divine origin. A cuff on the ear was the answer, and John was given until sundown to apologize. He did not apologize.

And young Tyndale then vowed he would change his name to Tyndall and forever separate himself from a person whose religion was so largely mixed with brutality. But yet John Tyndale was not a bad man. He had intellect far above the average of his neighbors. He had the courage of his convictions. His son had the courage of his lack of convictions.

And the early drilling in the Bible was a good thing

for young Tyndall. Bible legend and allusion color the English language, and any man who does not know his Bible well, can never hope to speak or write English with grace and fluency. Tyndall always knew and acknowledged his indebtedness to his parents, and he also knew that his salvation depended upon getting away from and beyond the narrow confines of their beliefs and habits. Because a thing helps you in a certain period of your education is no reason why you should feed upon it forevermore.

This way lies arrested development.

Life, like heat, is a mode of motion, and progress consists in discarding a good thing as soon as you have found a better.

# JOHN TYNDALL

OCCASIONALLY Herbert Spencer used to spend a Sunday afternoon with the Carlyles at their modest home in Chelsea. At such times Jeannie Welsh would usually manage to pilot the conversational craft along smooth waters; but if she were not present, hot arguments would follow, and finally a point would be reached where Carlyle and Spencer would simply sit and glare at each other ☙ ☙

"After such scenes I always thought less of two persons, Carlyle and myself," said Spencer; " and so for many years I very cautiously avoided Cheyne Row." Then there was another man Spencer avoided, although for a different reason; this individual was John Tyndall. ¶ On the death of Tyndall, Spencer wrote:

" There has just died the greatest teacher of modern times: a man who stimulated thought in old and young, every one he met, as no one else I ever knew did. Once we went together for a much-needed rest to the Lake District. Gossip, which has its advantages in that it can be carried on with no tax on one's intellectual powers, had no part in our conversation. The discussion of great themes began at once wherever Tyndall was.

" The atmosphere of the man was intensely stimulating: everybody seemed to become great and wise and good in his presence.

" We walked on the shores of Windermere, climbed Rydal

Mount, rowed across Lake Grasmere (leaving our names on the visitors' list), and all the time we dwelt upon high Olympus and talked.

"But, alas! Tyndall's vivacity undid me: two days of his company, with two sleepless nights, and I fled him as I would a pestilence."

But Carlyle growled out one thing in Spencer's presence which Spencer often quoted. "If I had my own way," said Carlyle, "I would send the sons of poor men to college, and the sons of rich men I would set to work."

¶ Manual labor in right proportion means mental development. Too much hoe may slant the brow, but hoe in proper proportion develops the cerebellum.

In the past we have had one set of men do all the work, and another set had all the culture: one hoes and another thirsts. There are whole areas of brain-cells which are evolved only through the efforts of hand and eye, for it is the mind at last that directs all our energies. The development of brain and body go together—manual work is brain-work. Too much brain-work is just as bad as too much toil; the misuse of the pen carries just as severe a penalty as the misuse of the hoe. And it is a great satisfaction to realize that the thinking world has reached a point where these propositions do not have to be proven.

There was a time when Spencer regretted that he had not been sent to college, instead of being set to work. But later he came to regard his experience as a practical

engineer and surveyor as a very precious and necessary part of his education.

John Tyndall and Alfred Russel Wallace had an experience almost identical. In childhood John attended the village school for six months of the year, and the rest of the time helped his parents, as children of poor people do. When nineteen he went to work carrying a chain in a surveying corps. Steady attention to the business in hand brought its sure reward, and in a few years he had charge of the squad, and was given the duty of making maps and working out complex calculations in engineering.

In mathematics he especially excelled. Five years in the employ of the Irish Ordnance Survey and three years in practical railroad-building, and Tyndall got the Socialistic bee in his bonnet. He resigned a good position to take part in bringing about the millennium. ¶ That he helped the old world along toward the ideal there is no doubt; but Tyndall is dead and Jerusalem is not yet. When the rule of the barons was broken, and the stage of individualism or competition was ushered in, men said, " Lo! The time is at hand and now is." But it was not. Socialism is coming, by slow degrees, imperceptibly almost as the growing of Spring flowers that push their way from the damp, dark earth into the sunlight. And after Socialism, what? Perhaps the millennium will still be a long way off.

In Eighteen Hundred Forty-seven, when Tyndall was

twenty-seven years old, Robert Owen, one of the greatest practical men the world has ever seen, cried aloud, " The time is at hand! "

Owen was an enthusiast: all great men are. He had risen from the ranks by the absolute force of his great untiring, restless and loving spirit. From a day laborer in a cotton-mill he had become principal owner of a plant that supported five thousand people.

Owen saw the difference between joyless labor and joyful work. His mills were cleanly, orderly, sanitary, and surrounded with lawns, trees and shrubbery. He was the first man in England to establish kindergartens, and this he did at his own expense for the benefit of his helpers. He established libraries, clubs, swimming-pools, night-schools, lecture-courses. And all this time his business prospered.

To the average man it is a miracle how any one individual could bear the heaviest business burdens and still do what Robert Owen did.

Robert Owen had vitality plus: he was a gourmet for work. William Morris was just such a man, only with a bias for art; but both Owen and Morris had the intensity and impetus which get the thing done while common folks are thinking about it.

Owen was familiar with every detail of his vast business, and he was an expert in finance. Like Napoleon he said: " The finances? I will arrange them."

Robert Owen erected schoolhouses, laid out gardens,

built mills, constructed tenements, traveled, lectured, and wrote books. His enthusiasm was contagious. He was never sick—he could not spare the time—and a doctor once said, " If Robert Owen ever dies, it will be through too much Robert Owen."

Owen went over to Dublin on one of his tours, and lectured on the ideal life, which to him was Socialism, " each for all and all for each."

Fourier, the dreamer, supplied a good deal of the argument, but Robert Owen did the thing. Socialism always catches these two classes, doers and dreamers, workers and drones, honest men and rogues, those with a desire to give and those with a lust to get.

Among others who heard Owen speak at Dublin was the young Irish engineer, John Tyndall. Tyndall was the type of man that must be common before we can have Socialism. There was not a lazy hair in his head; aye, nor a selfish one, either. He had a tender heart, a receptive brain and the spirit of obedience, the spirit that gives all without counting the cost, the spirit that harkens to the God within. And need I say that the person who gives all, gets all! The economics of God are very simple: We receive only that which we give. The only love we keep is the love we give away.

These are very old truths—I did not discover nor invent them—they are not covered by copyright: " Cast thy bread upon the waters."

John Tyndall was melted by Owen's passionate appeal

of each for all and all for each. To live for humanity seemed the one desirable thing. His loving Irish heart was melted. He sought Owen out at his hotel, and they talked, talked till three o'clock in the morning.

Owen was a judge of men; his success depended upon this one thing, as that of every successful business must. He saw that Tyndall was a rare soul and nearly fulfilled his definition of a gentleman. Tyndall had hope, faith and splendid courage; but best of all, he had that hunger for truth which classes him forever among the sacred few.

During his work out of doors on surveying trips he had studied the strata; gotten on good terms with birds, bugs and bees; he knew the flowers and weeds, and loved all the animate things of Nature, so that he recognized their kinship to himself, and he hesitated to kill or destroy.

Education is a matter of desire, and a man like Tyndall is getting an education wherever he is. All is grist that comes to his mill.

Robert Owen had but recently started "Queenswood College" in Hampshire, and nothing would do but Tyndall should go there as a teacher of science.

"Is he a skilled and educated teacher?" some one asked Owen. "Better than that," replied Owen; "he is a regular firebrand of enthusiasm."

And so Tyndall resigned his position with the railroad and moved over to England, taking up his home at

"Harmony Hall." ¶Harmony Hall was a beautiful brick building with the letters C. M. carved on the cornerstone in recognition of the Commencement of the Millennium. The pupils were mostly workers in the Owen mills who had shown some special aptitude for education. The pupils and teachers all worked at manual labor a certain number of hours daily. There was a delightful feeling of comradeship about the institution. Tyndall was happy in his work.

He gave lectures on everything, and taught the things that no one else could teach, and of course he got more out of the lessons than any of the scholars.

But after a few months' experience with the ideal life, Tyndall had commonsense enough to see that Harmony Hall, instead of being the spontaneous expression of the people who shared its blessings, was really a charity maintained by one Robert Owen. It was a beneficent autocracy, a sample of one-man power, beautifully expressed

Robert Owen planned it, built it, directed it and made good any financial deficit. Instead of Socialism it was a kindly despotism. A few of the scholars did their level best to help themselves and help the place, but the rest did n't think and did n't care. They were passengers who enjoyed the cushioned seats. A few, while partaking of the privileges of the place, denounced it

"You can not educate people who do not want to be

educated," said Tyndall. The value of an education lies in the struggle to get it. Do too much for people, and they will do nothing for themselves.

Many of the students at Harmony Hall had been sent there by Owen, because he, in the greatness of his heart and the blindness of his zeal, thought they needed education. They may have needed it; but they did not want it: ease was their aim.

The indifference and ingratitude Robert Owen met with did not discourage him: it only gave him an occasional pause. He thought that the bad example of English society was too close to his experiments: it vitiated the atmosphere.

So he came over to America and founded the town of New Harmony, Indiana. The fine solid buildings he erected in Posey County, then a wilderness, are still there ☙ ☙

As for the most romantic and interesting history of New Harmony, Robert Owen and his socialistic experiments, I must refer the gentle reader to the Encyclopedia Britannica, a work I have found very useful in the course of making my original researches.

After a year at Harmony Hall, Tyndall saw that he would have to get out or else become a victim of arrested development, through too much acceptance of a strong man's bounty. " You can not afford to accept anything for nothing," he said. Life at Harmony Hall to him was very much like life in a monastery, to which stricken

men flee when the old world seems too much for them. "When all the people live the ideal life, I 'll live it; but until then I 'm only one of the great many strugglers." Besides, he felt that in missing university training he had dropped something out of his life. Now he would go to Germany and see for himself what he had missed

While railroading he had saved up nearly four hundred pounds. This money he had offered at one time to invest in shares in the Owen mills. But Robert Owen said, "Wait two years and then see how you feel!"

Robert Owen was not a financial exploiter. Tyndall may have differed with him in a philosophic way; but they never ceased to honor and respect each other.

¶ And so John Tyndall bade the ideal life good-by, and went out into the stress, strife and struggle, resolved to spend his two thousand dollars in bettering his education, and then to start life anew.

# JOHN TYNDALL

ROBERT OWEN had been over to America and had met Emerson, and very naturally caught it. When he returned home he gave young Tyndall a copy of Emerson's first book, the "Essay on Nature," published anonymously. ¶ Tyndall read and re-read the book, and read it aloud to others and spoke of it as a "message from the gods." ¶ He also read every word that Carlyle put in print. It was Carlyle who introduced him to German philosophy and German literature, and fired him with a desire to see for himself what Germany was doing.

Germany had still another mystic tie that drew him thitherward. It was at Marburg, Germany, that his illustrious namesake had published his translation of the Bible.

At Marburg tnere was a University, small, 't was true, but its simplicity and the cheapness of living there were recommendations. So to Marburg he went. Tyndall found lodgings in a little street called "Heretics' Row." Possibly there be people who think that Tyndall's taking a room in such a street was chance, too. Chance is natural law not understood.

Marburg is a very lovely little town that clings amid a forest of trees to the rocky hillside overlooking the River Lahn. Tyndall was very happy at Marburg, and at times very miserable. The beauty of the place appealed to him. He was a climber by nature, and the hills were a continual temptation.

But the language was new; and before this his work had all been of a practical kind. College seems small and trivial after you have been in the actual world of affairs. But Tyndall did not give up. He rose every morning at six, took his cold bath, dressed and ran up the hill half a mile and back. He breakfasted with the family, that he might talk German. Then he dived into differential calculus and philosophical abstrusities. He was not sent to college: he went. And he made college give up all it had. On the wall of his room, as a sort of ornamental frieze in charcoal, he wrote this from Emerson: " High knowledge and great strength are within the reach of every man who unflinchingly enacts his best."

¶ Down in the town was a bronze bust of a man who wrote for it the following inscription: " This is the face of a man who has struggled energetically."

One might almost imagine that Hawthorne had received from Tyndall the hint which evolved itself into that fine story, " The Great Stone Face."

The bust just mentioned, attracted John Tyndall for another reason: Carlyle had written of the man it symboled: " Reader, to thee, thyself, even now, he has one counsel to give, the secret of his whole poetic alchemy. Think of living! Thy life, wert thou the pitifullest of all the sons of earth, is no idle dream, but a solemn reality. It is thine own; it is all thou hast with which to front eternity. Work, then, even as he has done—like a star, unhasting and unresting."

AT Marburg, Tyndall was on good terms with the great Bunsen, and used to act as his assistant in making practical chemical experiments before his classes.

These amazing things done by chemists in public are seldom of much value beyond giving a thrill to visitors who would otherwise drowse; it is like humor in an oration: it opens up the mental pores.

Alexander Humboldt once attended a Bunsen lecture at Marburg and complimented Tyndall by saying, "When I take up sleight-of-hand work, consider yourself engaged as my first helper." Tyndall's way of standing with his back to the audience, shutting off the view of Bunsen's hands while he was getting ready to make an artificial peal of thunder, made Humboldt laugh heartily.

Humboldt thought so well of the young man who spoke German with an Irish accent, that he presented him with an inscribed copy of one of his books. The volume was a most valuable one, for Humboldt published only in deluxe, limited editions, and Tyndall was so overcome that all he could say was, "I 'll do as much for you some day." Not long after this, through loaning money to a fellow student, Tyndall found himself sadly in need of funds, and borrowed two pounds on the book from an 'Ebrew Jew.

That night, he dreamed that Humboldt found the volume in a secondhand store. In the morning, Tyndall

was waiting for the pawnbroker to open his shop to get the book back ere the offense was discovered ℵ Heinrich Heine once inscribed a volume of his poems to a friend, and afterward discovered the volume on the counter of a secondhand dealer. He thereupon haggled with the bookman, bought the book and beneath his first inscription wrote, "With the renewed regards of H. Heine." He then sent the volume for the second time to his friend. 'T is possible that Tyndall had heard of this ℵ ℵ

In Eighteen Hundred Fifty, when Tyndall was thirty years of age, he visited London, and of course went to the British Institution. There he met Faraday for the first time and was welcomed by him.

The British Institution consists of a laboratory, a museum and a lecture-hall, and its object is scientific research. It began in a very simple way in one room and now occupies several buildings.

It was founded by Benjamin Thompson, an American, and so it was but proper that its sister concern, the Smithsonian Institution, should have been founded by an Englishman.

Sir Humphry Davy on being asked, "What is your greatest discovery?" replied, "Michael Faraday." But this was a mere pleasantry, the truth being that it was Michael Faraday who discovered Sir Humphry Davy. Faraday was a bookbinder's apprentice, a fact that should interest all good Roycrofters. ¶ Evenings,

when Sir Humphry Davy lectured at the British Institution, the young bookbinder was there. After the lecture he would go home and writé out what he had heard, with a few ideas of his own added. For be it known, taking notes at a lecture is a bad habit—good reporters carry no notebooks.

After a year Faraday sent a bundle of his impressions and criticisms to Sir Humphry Davy anonymously. Great men seldom read manuscript that is sent to them unless it refers to themselves. At the next lecture, Sir Humphry began by reading from Faraday's notes, and begged that if the writer were present, he would make himself known at the close of the address.

From this was to ripen a love like that of father and son. Every man who builds up such a work as did Sir Humphry Davy is appalled, when he finds Time furrowing his face and whitening his hair, to think how few indeed there are who can step in and carry his work on after he is gone.

The love of Davy for the young bookbinder was almost feverish: he clutched at this bright, impressionable and intent young man who entered so into the heart and soul of science; nothing would do but he must become his assistant. "Give up all and follow me!" And Faraday did.

Something of the same feeling must have swept over Faraday after his work of twenty-five years as director of the British Institution, when John Tyndall appeared,

tall, thin, bronzed, animated, quoting Bunsen and Humboldt with an Irish accent.

And so in time Tyndall became assistant to Faraday, then lecturer in natural history; and when Faraday died, Tyndall, by popular acclaim, was made Fullerian Lecturer and took Faraday's place. This was to be his life-work, and it so placed him before the world that all he said or did had a wide significance and an extended influence

# JOHN TYNDALL

TYNDALL was always a most intrepid mountain-climber. The Alps lured him like the song of the Lorelei, and the wonder was that his body was not left in some mountain crevasse, " the most beautiful and poetic of all burials," he once said.

But for him this was not to be, for Fate is fond of irony. The only man who ever braved the full dangers of the Grand Canon of the Colorado was killed by a suburban train in Chicago while on his wedding-tour. Most bad men die in bed, tenderly cared for by trained nurses in white caps and big aprons.

Tyndall climbed to the summit of the Matterhorn, ascended the so-called inaccessible peak of the Weisshorn, scaled Mont Blanc three times, and once was caught in an avalanche, riding toward death at the rate of a mile a minute. Yet he passed away from an overdose, or a wrong dose, of medicine given him through mistake, by the hands of the woman he loved most

At one time Tyndall attempted to swim a mountain-torrent; the stream, as if angry at his Irish assurance, tossed him against the rocks, brought him back in fierce eddies, and again and again threw him against a solid face of stone. When he was rescued he was a mass of bruises, but fortunately no bones were broken. It was some days before he could get out, and in his sorry plight, bandaged so his face was scarcely visible, Spencer

found him. "Herbert, do you believe in the actuality of matter?" was John's first question.

Both Tyndall and Huxley made application to the University of Toronto for positions as teachers of science; but Toronto looked askance, as all pioneer people do, at men whose college careers have been mostly confined to giving college absent treatment.

¶ Herbert Spencer avowed again and again that Tyndall was the greatest teacher he ever knew or heard of, inspiring the pupil to discover for himself, to do, to become, rather than imparting prosy facts of doubtful pith and moment. But Herbert Spencer, not being eligible to join a university club himself, was possibly not competent to judge.

Anyway, England was not so finical as Canada, and so she gained what Canada lost.

# JOHN TYNDALL

TYNDALL paid a visit to the United States in the year Eighteen Hundred Seventy-two, and lectured in most of the principal cities, and at all the great colleges. He was a most fascinating speaker, fluent, direct, easy, and his whole discourse was well seasoned with humor.

Whenever he spoke, the auditorium was taxed to its utmost, and his reception was very cordial, even in colleges that were considered exceedingly orthodox. ¶ Possibly, some good people who invited him to speak did not know it was loaded; and so his earnest words in praise of Darwin and the doctrine of evolution, occasionally came like unto a rumble of his own artificial thunder. "I speak what I think is truth; but of course, when I express ungracious facts I try to do so in what will be regarded as not a nasty manner," said Tyndall, thus using that pet English word in a rather pleasing way.

In his statement that the prayer of persistent effort is the only prayer that is ever answered, he met with a direct challenge at Oberlin. This gave rise to what, at the time, created quite a dust in the theological road, and evolved "The Tyndall Prayer Test."

Tyndall proposed that one hundred clergymen be delegated to pray for the patients in any certain ward of Bellevue Hospital. If, after a year's trial, there was a marked decrease in mortality in that ward, as compared with previous records, we might then conclude

that prayer was efficacious, otherwise not. ¶ One good clergyman in Pittsburgh offered publicly to debate "Darwinism" with Tyndall, but beyond a little scattered shrapnel of this sort, the lecture-tour was a great success. It netted just thirteen thousand dollars, the whole amount of which Tyndall generously donated as a fund to be used for the advancement of natural science in America.

In Eighteen Hundred Eighty-five, this fund had increased to thirty-two thousand dollars, and was divided into three equal parts and presented to Columbia, Harvard and the University of Pennsylvania. The fund was still further increased by others who followed Professor Tyndall's example, and Columbia, from her share of the Tyndall fund, I am told now supports two foreign scholarships for the benefit of students who show a special aptitude in scientific research. Professor James of Harvard once said: "The impetus to popular scientific study caused by Professor Tyndall's lectures in the United States was most helpful and fortunate. Speaking but for myself, I know I am a different man and a better man, for having heard and known John Tyndall."

# JOHN TYNDALL

WHEN John Tyndall died, in the year Eighteen Hundred Ninety-three, Spencer wrote:

It never occurred to Tyndall to ask what it was politic to say, but simply to ask what was true. The like has of late years been shown in his utterances concerning political matters—shown, it may be, with too great frankness. This extreme frankness was displayed also in private, and sometimes, perhaps, too much displayed; but every one must have the defects of his qualities. Where absolute sincerity exists, it is certain now and then to cause an expression of a feeling or opinion not adequately restrained.

"But the contrast in genuineness between him and the average citizen was very conspicuous. In a community of Tyndalls (to make a rather wild supposition), there would be none of that flabbiness characterizing current thought and action—no throwing overboard of principles elaborated by painful experience in the past, and adoption of a hand-to-mouth policy unguided by any principle. He was not the kind of man who would have voted for a bill or a clause which he secretly believed would be injurious, out of what is euphemistically called 'party loyalty,' or would have endeavored to bribe each section of the electorate by 'ad captandum' measures, or would have hesitated to protect life and property for fear of losing votes. What he saw right to do he would have done, regardless of proximate consequences. ¶ The ordinary tests

of generosity are very defective. As rightly measured, generosity is great in proportion to the amount of self-denial entailed; and where ample means are possessed, large gifts often entail no self-denial. Far more self-denial may be involved in the performance, on another's behalf, of some act that requires time and labor. In addition to generosity under its ordinary form, which Professor Tyndall displayed in unusual degree, he displayed it under a less common form.

" He was ready to take much trouble to help friends. I have had personal experience of this. Though he had always in hand some investigation of great interest to him, and though, as I have heard him say, when he bent his mind to the subject he could not with any facility break off and resume it again, yet, when I have sought scientific aid, information or critical opinion, I never found the slightest reluctance to give me his undivided attention. Much more markedly, however, was this kind of generosity shown in another direction. Many men, while they are eager for appreciation, manifest little or no appreciation of others, and still less go out of their way to express it.

" With Tyndall it was not thus; he was eager to recognize achievement. Notably in the case of Michael Faraday, and less notably, though still conspicuously in many cases, he has bestowed much labor and sacrificed many weeks in setting forth the merits of others. It was evidently a pleasure to him to dilate on the

claims of fellow workers. ¶ But there was a derivative form of this generosity calling for still greater eulogy. He was not content with expressing appreciation of those whose merits were recognized, but he used energy unsparingly in drawing the attention of the public to those whose merits were unrecognized; time after time in championing the cause of such, he was regardless of the antagonism he aroused and the evil he brought upon himself. This chivalrous defense of the neglected and ill-used has been, I think by few, if any, so often repeated. I have myself more than once benefited by his determination, quite spontaneously shown, that justice should be done in the apportionment of credit; and I have with admiration watched like actions of his in other cases: cases in which no consideration of nationality or of creed interfered in the least with his insistence on equitable distribution of honors.

" In this undertaking to fight for those who were unfairly dealt with, he displayed in another direction that very conspicuous trait which, as displayed in his Alpine feats, has made him to many persons chiefly known: I mean courage, passing very often into daring. And here let me, in closing this little sketch, indicate certain mischiefs which this trait brought upon him. Courage grows by success. The demonstrated ability to deal with dangers produces readiness to meet more dangers, and is self-justifying where the muscular power and the nerve habitually prove adequate. But the

resulting habit of mind is apt to influence conduct in other spheres, where muscular power and nerve are of no avail—is apt to cause the daring of dangers which are not to be met by strength of limb or by skill. Nature as externally presented by precipice ice-slopes and crevasses may be dared by one who is adequately endowed; but Nature, as internally represented in the form of physical constitution, may not be thus dared with impunity. Prompted by high motives, John Tyndall tended too much to disregard the protests of his body.

" Over-application in Germany caused absolute sleeplessness, at one time, I think he told me, for more than a week; and this, with kindred transgressions, brought on that insomnia by which his after-life was troubled, and by which his power for work was diminished; for, as I have heard him say, a sound night's sleep was followed by a marked exaltation of faculty.

" And then, in later life, came the daring which, by its results, brought his active career to a close. He conscientiously desired to fulfil an engagement to lecture at the British Institution, and was not deterred by fear of consequences.

" He gave the lecture, notwithstanding the protest which for days before his system had been making. The result was a serious illness, threatening, as he thought at one time, a fatal result; and notwithstanding a year's furlough for the recovery of health, he was

eventually obliged to resign his position. But for this defiance of Nature, there might have been many more years of scientific exploration, pleasurable to himself and beneficial to others; and he might have escaped that invalid life which for a long time he had to bear. In his case, however, the penalties of invalid life had great mitigations—mitigations such as fall to the lot of few.

"It is conceivable that the physical discomforts and mental weariness which ill-health brings may be almost, if not quite, compensated by the pleasurable emotions caused by unflagging attentions and sympathetic companionship. If this ever happens, it happened in his case. All who have known the household during these years of nursing are aware of the unmeasured kindness he has received without ceasing. I happen to have had special evidence of this devotion on the one side and gratitude on the other, which I do not think I am called upon to keep to myself, but rather to do the contrary. In a letter I received from him some half-dozen years ago, referring, among other things, to Mrs. Tyndall's self-sacrificing care of him, occurred this sentence: 'She has raised my ideal of the possibilities of human nature.'"

ALFRED R. WALLACE

" Amok " is an innovation which I do not recommend. It consists in letting go when things get too bad, and doing damage with tongue, hands and feet. It is the tantrum carried to its logical conclusion. I saw one instance where a henpecked husband " ran amok " and killed or wounded seventeen people before he himself was killed. It is the national and therefore the honorable mode of committing suicide among the natives of Celebes, and is the fashionable way of escaping from their difficulties. A man can not pay, he is taken for a slave, or has gambled away his wife or child into slavery, he sees no way of recovering what he has lost, and becomes desperate. He will not put up with such cruel wrongs, but will be revenged on mankind and die like a hero. He grasps his knife, and the next moment draws out the weapon and stabs a man to the heart. He runs on with bloody kris in his hand, stabbing every one he meets. " Amok! Amok! " then resounds through the streets. Spears, krises, knives, guns and clubs are brought out against him. He rushes madly forward, kills all he can—men, women and children—and dies, overwhelmed by numbers, amid all the excitement of a battle.

*—Alfred Russel Wallace, in " The Malay Archipelago "*

ALFRED RUSSEL WALLACE

# ALFRED R. WALLACE

THE question of how this world and all the things in it were made, has, so far as we know, always been asked. And volunteers have at no time been slow about coming forward and answering. For this service the volunteer has usually asked for honors and also exemption from toil more or less unpleasant.

He has also demanded the joy of riding in a coach, being carried in a palanquin, and sitting on a throne clothed in purple vestments, trimmed with gold lace or costly furs. Very often the volunteer has also insisted on living in a house larger than he needed, having more food than his system required, and drinking decoctions that are costly, spicy and peculiar.

All of which luxury has been paid for by the people, who are told that which they wish to hear.

The success of the volunteer lies in keeping one large ear close to the turf.

Religious teachers have ever given to their people a cosmogony that was adapted to their understanding. ¶ Who made it? God made it all. In how long a time? Six days. And then followed explanations of what God did each day.

Over against the volunteers with a taste for power

and a fine corkscrew discrimination, there have been at rare intervals men with a desire to know for the sake of knowing. They were not content to accept any man's explanation. The only thing that was satisfying to them was the consciousness that they were inwardly right. Loyalty to the God within was the guiding impulse of their lives.

In the past, such men have been regarded as eccentric, unreliable and dangerous, and the volunteers have ever warned their congregations against them.

Indeed, until a very few years ago they were not allowed to express themselves openly. Laws have been passed to suppress them, and dire penalties have been devised for their benefit. Laws against sacrilege, heresy and blasphemy still ornament our statute-books; but these invented crimes that were once punishable by death are now obsolete, or exist in rudimentary forms only, and manifest themselves in a refusal to invite the guilty party to our Four-o'Clock. This hot intent to support and uphold the volunteers in their explanations of how the world was made, is a universal manifestation of the barbaric state, and is based upon the assumption that God is an infinite George the Fourth.

Six hundred years before Christ, Anaximander, the Greek, taught that animal life was engendered from the earth through the influence of moisture and heat, and that life thus generated gradually evolved into higher and different forms: all animals once lived in

the water, but some of them becoming stranded on land put forth organs of locomotion and defense, through their supreme resolve to live. Anaximander also taught that man was only a highly developed animal, and his source of life was the same as that of all other animals; man's present high degree of development having gradually come about through growth from very lowly forms.

Anaxagoras, the schoolmaster of Pericles, also made similar statements, and then we find him boldly putting forth the very startling idea that between the highest type of Greek and the lowest type of savage there was a greater difference than between the savage and the ape. He also taught that the earth was the universal mother of all living things, animal and vegetable, and that the fecundation of the earth took place from minute, unseen germs that floated in the air.

According to modern science, Anaxagoras was very close upon the trail of truth. But there were only a very few who could follow him, and it took the combined eloquence and tact of Pericles to keep his splendid head in the place where Nature put it, and Pericles himself was compromised by his leaning toward " Darwinism." ☙ ☙

Every man who speaks, expresses himself for others. We succeed only as our thought is echoed back to us by others who think the same. If you like what I say it is only because it is already yours. Moreover, thought

is a collaboration, and is born of parents. If a teacher does not get a sympathetic hearing, one of two things happens: he loses the thread of his thought and grows apathetic, or he arouses an opposition that snuffs out his life.

And the dead they soon grow cold.

The recipe for popularity is to hunt out a weakness of humanity and then bank on it. No one knows this better than your theological volunteer. Aristotle, the father of natural history, who early in life had a Pegasus killed under him, taught that the diversity in animal life was caused by a diversity of conditions and environment, and he declared he could change the nature of animals by changing their surroundings. This being true he argued that all animals were once different from what they are now, and that if we could live long enough, we would see that species are exceedingly variable ☙ ☙

To explain to child-minds that a Supreme Being made things outright just as they are, is easy; but to study and in degree know how things evolved, requires infinite patience and great labor. It also means small sympathy from the indifferent whom the earth has spawned in swarms, and the hatred of the volunteers who ride in coaches, and tell the many what they wish to hear. ¶ The volunteers drove Aristotle into exile, and from his time they had their way for two thousand years, when John Ray, Linnæus and Buffon appeared. ¶ In

Seventeen Hundred Fifty-five, Immanuel Kant, the little man who stayed near home and watched the stars tumble into his net, put forth his theory that every animal organism in the world was developed from a common original germ.

In Seventeen Hundred Ninety-four, Erasmus Darwin, the grandfather of Charles Darwin, inspired by Kant and Goethe, put forth his book, " Zoonomia," wherein he maintained the gradual growth and evolution of all organisms from minute, unseen germs. These views were put forth more as a poetic hypothesis than as a well-grounded scientific fact, so little attention was paid to Erasmus Darwin's books. The fanciful accounts of Creation put forth by Moses three thousand years before were firmly maintained by the entrenched volunteers and their millions of devotees and followers ✍ But Kant, Goethe, Karl von Baer and August de Sainte-Hilaire were now planting their outposts throughout the civilized world, honeycombing Christendom with doubt ✍ ✍

In the year Eighteen Hundred Fifty-two, Herbert Spencer had argued in public and in pamphlets that species have undergone changes and modifications through change of surroundings, and that the account of Noah and his ark, with pairs of everything that flew, crept or ran, was fanciful and absurd, so far as we cared to distinguish fact from fiction.

Early in the year Eighteen Hundred Fifty-eight,

# ALFRED R. WALLACE

Charles Darwin received from his friend, Alfred Russel Wallace, a paper entitled, "On the Tendency of Varieties to Depart Indefinitely From the Original Type." At this time Darwin had in the hands of the secretary of the Linnæus Society a paper entitled, "On the Tendency of Species to Form Varieties, or the Perpetuation of Species and Varieties by Means of Natural Selection."

The similarity in title, as well as the similarity in treatment of the Wallace theme, startled Darwin. He had been working on the idea for twenty years, and had an immense mass of data bearing on the subject, which he some day intended to issue in book form.

His paper for the Linnæus Society simply summed up his convictions. And now here was a man with whom he had never discussed this particular subject, writing an almost identical paper and sending it to him—of all men!

Well did he pinch his leg, and call in his wife, asking her if he were alive or dead. Straightway he went to see Sir Charles Lyell and Sir Joseph Hooker, both more eminent than he in the scientific world, and laid the matter before them. After a long conference it was decided that both papers should be read the same evening before the Linnæus Society, and this was done on the evening of July First, Eighteen Hundred Fifty-eight

Darwin then decided to publish his "Origin of Species,"

which in his preface he modestly calls an " Abstract." The publication was hastened by the fact that Wallace was compiling a similar work. After giving Wallace full credit in his most interesting " Introduction," and reviewing all that others had said in coming to similar conclusions, Darwin fired his shot heard round the world. And no man was more delighted and pleased with the echoing reverberations than Alfred Russel Wallace, as he read the book in far-off Australia.

The honor of discovering the Law of Evolution, and lifting it out of the hazy realms of hypothesis and poetry into the sunlight of science, will ever be shared between Charles Robert Darwin and Alfred Russel Wallace, who were indeed brothers in spirit and lovers to the end of their days.

# ALFRED R. WALLACE

IN an insignificant village of England, now famous alone because he began from there his explorations of the world, Alfred Russel Wallace was born, in the year Eighteen Hundred Twenty-two. He was one of a large family of the middle class, where work is as natural as life, and the indispensable virtues are followed as a means of self-preservation. It is most unfortunate to attain such a degree of success that you think you can waive the decalogue and give Nemesis the slip.

About the year Eighteen Hundred Forty, the railroad renaissance was on in England, and young Wallace, alive, alert, active, did his turn as apprentice to a surveyor

Chance is a better schoolmaster than design. All boys have a taste for tent life, and healthy youngsters not quite grown, with ostrich digestions, passing through the nomadic stage, revel in hardships and count it a joy to sleep on the ground where they can look up at the stars, and eat out of a skillet.

A little later we find Alfred working for his elder brother in an architect's office, gazing abstractedly out of the window betimes, and wishing he were a ground-squirrel, fancy free on the heath and amid the heather, digging holes, thus avoiding introspection. "Houses are prisons," he said, and sang softly to himself the song of the open road.

I think I know exactly how Alfred Russel Wallace

then felt, from the touchstone of my own experience; and I think I know how he looked, too, all confirmed by an East Aurora incident.

Some years ago, one fine day in May, I was helping excavate for the foundation of a new barn. All at once I felt that some one was standing behind me looking at me. I turned around and there was a tall, lithe, slender youth in a faded college cap, blue flannel shirt, ragged trousers and top-boots. My first impression of him was that he was a fellow who slept in his clothes, a plain " Weary," but when he spoke there was a note of self-reliance in his low, well-modulated voice that told me he was no mendicant. Voice is the true index of character.

" My name is Wallace, and I have a note to you from my father," and he began diving into pockets, and finally produced a ragged letter that was nearly worn out through long contact with a perspiring human form divine—or partially so. I seldom make haste about reading letters of introduction, and so I greeted the young man with a word of welcome, and gave him a chance to say something for himself.

He was English, that was very sure—and Oxford English at that. " You see," he began, " I am working just now over on the Hamburg and Buffalo Electric Line, stringing wires. I get three dollars a day because I 'm a fairly good climber. I wanted to learn the business, so I just hired out as a laborer, and they gave me the

hardest job, thinking to scare me out, but that was what I wanted," and he smiled modestly and showed a set of incisors as fine and strong as a dog's teeth. " I want to remain with you for a week and pay for my board in work," he cautiously continued.

"But about your father, Mr. Wallace—do I know him?"

" I think so; he has written you several letters—Alfred Russel Wallace!"

You could have knocked me down with a lady's-slipper. I opened the letter and unmistakably it was from the great scientist, " introducing my baby boy."

I never met Alfred Russel Wallace, but I know if I should, I would find him very gentle, kindly and simple in all his ways—as really great men ever are. He would not talk to me in Latin nor throw off technical phrases about great nothings, and I would feel just as much at home with him as I did with Ol' John Burroughs the last time I saw him, leaning up against a country railroad-station in shirt-sleeves, chewing a straw, exchanging salutes with the engineer on a West Shore jerkwater. " S' long, John!" called the going one as he leaned out of the cab-window. " S' long, Bill, and good luck to you," was the cheery answer.

But still, all of us have moments when we think of the world's most famous ones as being surely eight feet tall, and having voices like fog-horns.

" I can do most any kind of hard work, you know"—

I was aroused from my little mental excursion, and

noticed that my visitor had hair of a light yellow like a Swede from Hennepin County, Minnesota, and that his hair was three shades lighter than his bronzed face. " I can do any kind of work, you know, and if you will just loan me that pick "—and I handed him the pickax. ¶ Young Wallace remained with us for a week, asking for nothing, doing everything, even to helping the girls wash dishes. That he was the son of a great man, no one would have ever learned from his own lips. In fact, I am not sure that he was impressed with his father's excellence, but I saw there was a tender bond between them, for he haunted the post-office, morning, noon and night, looking for a letter from his father. When it came he was as happy as a woodchuck. He showed me the letter: it was nine finely written pages.

But to my disappointment not a word about marsupials, siamangs or Syndactylæ: just news about John, William, Mary and Benjamin; with references to chickens and cows, and a new greenhouse, with a little good advice about keeping right hours and not overeating.

The young man had spent three years at Oxford, and was an electrical engineer. He was intent on finding out just as much about the secrets of American railroad construction as he possibly could. As for intellect, I did not discover any vast amount; perhaps, for that matter, he did n't either. But we all greatly enjoyed his visit, and when he went away I presented him with a clean, secondhand flannel shirt and my blessing.

# ALFRED R. WALLACE

FROM the appearance of the young man I imagine that Alfred Russel Wallace at twenty-one was very much such a man as his son, who did such good work at the Roycroft with pick and shovel. Alfred was earnest, intent, strong, and had a deal of quiet courage that he was as unconscious of as he was of his digestion. ¶ He taught school, and to interest his scholars he would take them on botanical excursions. Then he himself grew interested, and began to collect plants, bugs, beetles and birds on his own account.

By Eighteen Hundred Forty-eight, the confining walls of the school had become intolerable to Wallace, and he started away on a wild-goose chase to Brazil, with a chum by the name of Henry Walter Bates, an ardent entomologist. Alfred had no money either, but Bates had influence, and he cashed it in by arranging with the Curator of the British Museum, that any natural-history specimens of value which they might gather and send to him would be paid for. And so something like a hundred pounds was collected from several scientific men, and handed over as advance payment for the wonderful things that the young men were to send back.

They embarked on a sailing-vessel that was captained by a kind kinsman of Bates, so the fare was nil, in consideration of services rendered constructively ✠ Arriving in Brazil the young men began their collecting

of specimens. They got together a very creditable collection of birds' eggs and sent them back by the captain of the ship they came out on, this as an earnst of what was to come.

Bates and Wallace were together for a year. Bates insisted on remaining near the white settlements; but Wallace wanted to go where white men had never been. So alone he went into the forests, and for two years lived with the natives and dared the dangers of jungle-fever, snakes, crocodiles and savages. For a space of ten months he did not see a single white person.

He collected nearly ten thousand specimens of birds, which he skinned and carefully prepared so they could be mounted when he returned to England; there was also a nearly complete Brazilian herbarium, and a finer collection of birds' eggs than any museum of England could boast.

This collection represented over three years' continuous toil. All the curious things were packed with great care and placed on board ship.

And so the young naturalist sailed away for England, proud and happy, with his great collection of entomological, botanical and ornithological specimens.

But on the way the ship took fire, and the collection was either burned or ruined by soaking salt water. ¶ That the crew and their sole passenger escaped alive was a wonder. Wallace on reaching England was in a sorry plight, being destitute of clothes and funds.

¶ And there were unkind ones who did not hesitate to hint that he had only been over to Ireland working in a peat-bog, and that his knowledge of Brazil was gotten out of Humboldt's books.

In one way, Wallace surely paralleled Humboldt: both lost a most valuable collection of natural-history specimens by shipwreck.

Several of the good men who had advanced money now asked that it be paid. Wallace set to work writing out his recollections, the only asset that he possessed.

¶ His book, " Travel on the Amazon and Rio Negro," had enough romance in it so that it floated. Royalties paid over in crisp Bank of England notes made things look brighter. Another book was issued, called, " Palm-Trees and Their Uses," and proved that the author was able to view a subject from every side, and say all that was to be said about it. " Wallace on the Palm " is still a textbook.

The debts were paid, and Alfred Russel Wallace at thirty was square with the world, the possessor of much valuable experience. He also had five hundred pounds in cash, with a reputation as a writer and traveler that no longer caused bookworms to sneeze.

Having paid off his obligations, he felt free again to leave England, a thing he had vowed he would not do, so long as his reputation was under a cloud. This time he selected for a natural-history survey a section of the world really less known than South America.

# ALFRED R. WALLACE

EARLY in the year Eighteen Hundred Fifty-four, Alfred Russel Wallace reached Asia. He had decided that he would make the first and the best collection of the flora and fauna of the Malay Archipelago that it was possible to make.

White men had skirted the coast of many of the islands, but information as to what there was inland was mostly conjecture and guesswork.

Just how long it would take Wallace to make his Malaysian natural-history survey he did not know, but in a letter to Darwin he stated that he expected to be absent from England at least two years. He was gone eight years, and during this time, walked, paddled or rode horseback fifteen thousand miles, and visited many islands never before trod by the foot of a white man

The city of Singapore served him as a base or headquarters, because from there he could catch trading-ships that plied among the islands of the Archipelago; and to Singapore he could also ship and there store his specimens. From Singapore he made sixty separate voyages of discovery. In all he sent home over one hundred twenty-five thousand natural-history specimens, including about ten thousand birds, which, later on, were all stuffed and mounted under his skilful direction

On returning to England, Wallace took six years in

preparation of his book, "The Malay Archipelago," a most stupendous literary undertaking, which covers the subjects of botany, geology, ornithology, entomology, zoology and anthropology, in a way that serves as a regular mine of information and suggestion for natural-history workers.

The book in its original form, I believe, sold for ten pounds (fifty dollars), and was issued to subscribers in parts. It was bought, not only by students, but by a great number of general readers, there being enough adventure mixed up in the science to spice what otherwise might be rather dry reading. For instance, there is a chapter about killing orang-utans that must have served my old friend, Paul du Chaillu, as excellent raw stock in compiling his own recollections.

Wallace states that the only foe for which the orang really has a hatred is the crocodile. It seems to share with man a shuddering fear of snakes, although orangs have no part in making Kentucky famous. But the crocodile is his natural and hereditary enemy. And as if to get even with this ancient foe, who occasionally snaps off a young orang in his prime, the orangs will often locate a big crocodile, and jumping on his back beat him with clubs; and when he opens his gigantic mouth, the female orangs will fill the cavity with sticks and stones, and keep up the fight until the crocodile succumbs and quits this vale of crocodile tears.

The orang is distinct and different from the chimpanzee

and gorilla, which are found only in Western Africa. ¶ In Borneo, the " man-ape " is quite numerous. This is the animal that has given rise to all those tales about " the wild man of Borneo," which that good man, P. T. Barnum, kept alive by exhibiting a fine specimen. Barnum's original " wild man " lived at Waltham, Massachusetts, and belonged to the Baptist Church. He recently died worth a hundred thousand dollars, which money he left to found a school for young ladies. ¶ The orang, or mias, hides in the swampy jungles, and very rarely comes to the ground. The natives regard them as a sort of sacred object, and have a great horror of killing them. Indeed, a person who kills a man-ape, they regard as a murderer; and so when Wallace announced to his attendants that he wanted to secure several specimens of these " wild men of the woods," they cried, "Alas! he is making a collection: it will be our turn next! " And they fled in terror.

Wallace then hired another set of servants and resolved to make no confidants, but just go ahead and find his game

He had hunted for weeks through forest and jungle, but never a glimpse or sight of the man-ape! He had almost given up the search, and concluded with several English scientists that this orang-utan was a part of that great fabric of pseudo-science invented by imaginative sailormen, who took most of their inland little journeys around the capstan. And so musing, seated in

the doorway of his bamboo house, he looked out upon the forest, and there only a few yards away, swinging from tree to tree, was a man-ape. It seemed to him to be about five times as large as a man.

He seized his gun and approached; the beast stopped, glared, and railed at him in a voice of wrath. It broke off branches and threw sticks at him.

Wallace thought of the offer made him by the South Kensington Museum: "One hundred pounds in gold for an adult male, skin and skeleton to be properly preserved and mounted; seventy-five pounds for a female."

The huge animal showed its teeth, cast one glance of scornful contempt on the puny explorer, and started on, swinging thirty feet at a stretch and catching hold of the limbs with its two pairs of hands.

Wallace grasped his gun and followed, lured by the demoniac shape. A little of the superstition of the natives had gotten into his veins: he dare not kill the thing unless it came toward him, and he had to shoot it in self-defense.

It traveled in the trees about as fast as he could on the ground. Occasionally it would stop and chatter at him, throwing sticks in a most human way, as if to order him back.

Finally, the instincts of the naturalist got the better of the man, and he shot the animal. It came tumbling to the ground with a terrific crash, grasping at the

vines and leaves as it fell. ¶ It was quite dead, but Wallace approached it with great caution. It proved to be a female, of moderate size, in height about three and a half feet, six feet across from finger to finger. Needless to say that Wallace had to do the skinning and the mounting of the skeleton alone. His servants had chills of fear if asked to approach it. The skeleton of this particular orang can now be seen in the Derby Museum. ¶ In a few hours after killing his first orang, Wallace heard a peculiar crying in the forest, and on search found a young one, evidently the baby of the one he had killed. The baby did not show any fear at all, evidently thinking it was with one of its kind, for it clung to him piteously, with an almost human tenderness. ¶ Says Wallace:

" When handled or nursed it was very quiet and contented, but when laid down by itself would invariably cry; and for the first few nights was very restless and noisy. I soon found it necessary to wash the little mias as well. After I had done so a few times it came to like the operation, and after rolling in the mud would begin crying, and continue until I took it out and carried it to the spout, when it immediately became quiet, although it would wince a little at the first rush of the cold water, and make ridiculously wry faces while the stream was running over its head. It enjoyed the wiping and rubbing dry amazingly, and when I brushed its hair seemed to be perfectly happy,

lying quite still with its arms and legs stretched out. It was a never-failing amusement to observe the curious changes of countenance by which it would express its approval or dislike of what was given to it. The poor little thing would lick its lips, draw in its cheeks, and turn up its eyes with an expression of the most supreme satisfaction, when it had a mouthful particularly to its taste. On the other hand, when its food was not sufficiently sweet or palatable, it would turn the mouthful about with its tongue for a moment, as if trying to extract what flavor there was, and then push it all out between its lips. If the same food was continued, it would proceed to scream and kick about violently, exactly like a baby in a passion.

"When I had had it about a month it began to exhibit some signs of learning to run alone. When laid upon the floor it would push itself along by its legs, or roll itself over, and thus make an unwieldy progression. When lying in the box it would lift itself up to the edge in an almost erect position, and once or twice succeeded in tumbling out. When left dirty or hungry, or otherwise neglected, it would scream violently till attended to, varied by a kind of coughing noise, very similar to that which is made by the adult animal.

"If no one was in the house, or its cries were not attended to, it would be quiet after a little while; but the moment it heard a footstep would begin again, harder than ever. It was very human."

# ALFRED R. WALLACE

THE most lasting result of the wanderings of Alfred Russel Wallace consists in his having established what is known to us as "The Wallace Line." This line is a boundary that divides in a geographical way that portion of Malaysia which belongs to the continent of Asia from that which belongs to the continent of Australia.

The Wallace Line covers a distance of more than four thousand miles, and in this expanse there are three islands in which Great Britain could be set down without anywhere touching the sea.

Even yet the knowledge of the average American or European is very hazy about the size and extent of the Malay Archipelago, although through our misunderstanding with Spain, which loaded us up with possessions we have no use for, we have recently gotten the geography down and dusted it off a bit.

There is a book by Mrs. Rose Innes, wife of an English official in the Far East, who, among other entertaining things, tells of a head-hunter chief who taught her to speak Malay, and she, wishing to reciprocate, offered to teach him English; but the great man begged to be excused, saying, "Malay is spoken everywhere you go, east, west, north or south, but in all the world there are only twelve people who speak English," and he proceeded to name them.

Our assumptions are not quite so broad as this, but few of us realize that the Protestant Christian Religion

stands fifth in the number of communicants, as compared with the other great religions, and that against our hundred millions of people in America, the Malay Archipelago has over two hundred millions.

Wallace found marked geological, botanical and zoological differences to denote his line. And from these things he proved that there had been great changes, through subsidence and elevation of the land. At no very remote geologic period, Asia extended clear to Borneo, and also included the Philippine Islands. This is shown by the fact that animal and vegetable life in all of these islands is almost identical with life on the mainland: the same trees, the same flowers, the same birds, the same animals.

As you go westward, however, you come to islands which have a very different flora and fauna, totally unlike that found in Asia, but very similar to that found in Australia.

Australia, be it known, is totally different in all its animal and vegetable phenomena from Asia.

In Australia, until the white man very recently carried them across, there were no monkeys, apes, cats, bears, tigers, wolves, elephants, horses, squirrels or rabbits. Instead there were found animals that are found nowhere else, and which seem to belong to a different and so-called extinct geologic age, such as the kangaroo, wombats, the platypus—which the sailors used to tell us was neither bird not beast, and yet was both. In

birds, Australia has also very strange specimens, such as the ostrich which can not fly, but can outrun a horse and kills its prey by kicking forward like a man. Australia also has immense mound-making turkeys, honey-suckers and cockatoos, but no woodpeckers, quail or pheasants

Wallace was the first to discover that there are various islands, some of them several hundred miles from Australia, where the animal life is identical with that of Australia. And then there are islands, only a comparatively few miles away, which have all the varieties of birds and beasts found in Asia.

But this line that once separated continents is in places but fifteen miles wide, and is always marked by a deep-water channel, but the seas that separate Borneo and Sumatra from Asia, although wide, are so shallow that ships can find anchorage anywhere.

The Wallace Line, proving the subsidence of the sea and upheaval of the land, has never been seriously disputed, and is to many students the one great discovery by which Wallace will be remembered.

Wallace's book on " The Geographical Distribution of Animals " sets forth in a most interesting manner, the details of how he came to discover the Line.

It was in Eighteen Hundred Fifty-five that Wallace, alone in the wilds of the Malay Archipelago, became convinced of the scientific truth that species were an evolution from a common source, and he began making

notes of his observations along this particular line of thought. Some months afterward he wrote out his belief in the form of an essay, but then he had no definite intention of what he would do with the paper, beyond keeping it for future reference when he returned to England. In the Fall of Eighteen Hundred Fifty-seven, however, he decided to send it to Darwin to be read before some scientific society, if Darwin considered it worthy. And this paper was read on the evening of July First, before the Linnæus Society, with one by Darwin on the same subject, written before Wallace's paper arrived, wherein the identical views are set forth. Darwin and Wallace expressed what many other investigators had guessed or but dimly perceived.

# ALFRED R. WALLACE

IF the six immortal modern scientists, three began life working as surveyors and civil engineers—Wallace, Tyndall, Spencer. From the number of eminent men, not forgetting Henry Thoreau, Leonardo da Vinci, Lincoln, Ulysses S. Grant, Washington—aye! nor old John Brown, who carried a Gunter's chain and manipulated the transit—we come to the conclusion that there must be something in the business of surveying that conduces to clear thinking and strong, independent action.

If I had a boy who by nature and habit was given to futilities, I would apprentice him to a civil engineer. ¶ When two gangs of men begin a tunnel, working toward each other from different sides of a mountain, dreams, poetry, hypothesis and guesswork had better be omitted from the equation. Here is a case where metaphysics has no bearing. It is a condition that confronts them, not a theory.

Theological explanations are assumptions built upon hypotheses, and your theologian always insists that you shall be dead before you can know.

If a bridge breaks down or a fireproof building burns to ashes, no explanation on the part of the architect can explain away the miscalculation; but your theologian always evolves his own fog, into which he can withdraw at will, thus making escape easy. Darwin, Huxley, Spencer, Tyndall and Wallace all had the mathematical mind. Nothing but the truth would satisfy

them. In school, you remember how we sometimes used to work on a mathematical problem for hours or days. Many would give it up. A few of the class would take the answer from the book, and in an extremity force the figures to give the proper result. Such students, it is needless to say, never gained the respect of either class or teacher—or themselves. They had the true theological instinct. But a few kept on until the problem was solved, or the fallacy of it had been discovered. In life's school such were the men just named, and the distinguishing feature of their lives was that they were students and learners to the last.

Of this group of scientific workers, Alfred Russel Wallace alone survives, aged eighty-nine at this writing, still studying, earnestly intent upon one of Nature's secrets that four of his great colleagues years ago labeled "Unknown," and the other two marked "Unknowable."

¶ To some it is an anomaly and contradiction that a lover of science, exact, cautious, intent on certitude, should accept a belief in personal immortality. Still, to others this is regarded as positive proof of his superior insight.

All thinking men agree that we are surrounded by phenomena that to a great extent are unanalyzed; but Herbert Spencer, for one, thought it a lapse in judgment to attribute to spirit intervention, mysteries which could not be accounted for on any other grounds. It was equal to that sin against science which Darwin

committed, and which he atoned for in contrite public confession, when he said: "It surely must be this, otherwise what is it? Hence we assume," and so on. Some recent writers have sought to demolish Wallace's argument concerning Spiritism by saying he is an old man and in his dotage. Wallace once wrote a booklet entitled, "Vaccination a Fallacy," which created a big dust in Doctors' Row, and was cited as corroborative proof, along with his faith in Spiritism, that the man was mentally incompetent.

But this is a deal worse excuse for argument than anything Wallace ever put forth. The real fact is that Wallace issued a book on Spiritism in Eighteen Hundred Seventy-four, and in Eighteen Hundred Ninety-six reissued it with numerous amendments, confirming his first conclusions. So he has held his peculiar views on immortality for over thirty years, and moreover his mental vigor is still unimpaired.

Whether the proof he has received as to the existence of disembodied spirits is sufficient for others is very uncertain; but if it suffices for himself, it is not for us to quibble. Wallace agrees to allow us to have our opinions if we will let him have his.

His views are in no sense those of Christianity; rather, they might be called those of Theosophy, as the personal God and the dogma of salvation and atonement are entirely omitted.

The Doctrine of Evolution he carries into the realm of

spirit. His belief is that souls reincarnate themselves many times for the ultimate object of experience, growth and development. He holds that this life is the gateway to another, but that we should live each day as though it were our last.

To this effect we find, in a recent article, Wallace quotes a little story from Tolstoy: A priest, seeing a peasant in a field plowing, approached him and asked, "How would you spend the rest of this day if you knew you were to die tonight?"

The priest expected the man, who was a bit irregular in his churchgoing, to say, "I would spend my last hours in confession and prayer." But the peasant replied, "How would I spend the rest of the day if I were to die tonight?—why, I 'd plow!"

Hence, Wallace holds that it is better to plow than to pray, and that in fact, when rightly understood, good plowing is prayer.

All useful effort is sacred, and nothing else is or ever can be. Wallace believes that the only fit preparation for the future lies in improving the present. Please pass the dotage!

JOHN FISKE

In a sinless and painless world the moral element would be lacking; the goodness would havè no more significance in our conscious life than that load of atmosphere which we are always carrying about with us.

We are thus brought to a striking conclusion, the essential soundness of which can not be gainsaid. In a happy world there must be pain and sorrow, and in a moral world the knowledge of evil is indispensable. The stern necessity for this has been proved to inhere in the innermost constitution of the human soul. It is part and parcel of the universe.

We do not find that evil has been interpolated into the universe from without; we find that, on the contrary, it is an indispensable part of the dramatic whole. God is the creator of evil, and from the eternal scheme of things diabolism is forever excluded.

From our present standpoint we may fairly ask, what would have been the worth of that primitive innocence portrayed in the myth of the Garden of Eden, had it ever been realized in the life of men? What would have been the moral value or significance of a race of human beings ignorant of sin, and doing beneficent acts with no more consciousness or volition than the deftly contrived machine that picks up raw material at one end, and turns out some finished product at the other? Clearly, for strong and resolute men and women, an Eden would be but a fool's paradise.

*"Through Nature to God"*

JOHN FISKE

# JOHN FISKE

EARLY in life John Fiske aimed high and thought himself capable of great things. He also believed that the world accepted a man at the estimate he placed upon himself. ¶ Fiske was born at Hartford in Eighteen Hundred Forty-two. His mother's maiden name was Fiske and his father's name was Green, and until well-nigh manhood, John Fiske was called Edmund Green. ¶ His father died while Edmund was a baby, and the wee youngster was taken charge of by his grandmother Fiske of Middletown, Connecticut.

When his mother married again, Edmund did not approve of the match. Parents often try to live their children's lives for them, and to hold the balance true, children occasionally attempt to dictate to parents in affairs of the heart. A young man by the name of Hamlet will be recalled who, having no special business of his own, became much distressed and had theories concerning the conduct of his mother. As a general proposition the person who looks after the territory directly under his own hat will find his time fairly well employed. ¶ They say Edmund Green made threats when his mother changed her name, but all he did was to follow her example and change his. Thereafter he was plain

John Fiske. " I must have a name easy to take hold of: one that people can remember," he said. And they do say that John Fiske's reverence for John Ruskin had something to do with his choice of name.

Just here some curious one of the curious sex, which by the way holds no monopoly on curiosity, may ask if the second venture of Mrs. Green was fruitful and fortunate. So I will say, yes, eminently so; and in one way it seemed to serve, for John Fiske's stepfather waived John's displeasure with his stepfather's wife, and did something toward sending the young man to Harvard University, and also supplied the funds to send him on a tour around the world.

However, the second brood revealed no genius, at sight of which the defunct Mr. Green from his seat in Elysium must have chortled in glee, assuming, of course, that disembodied spirits are cognizant of the doings of their late partners, as John Fiske seemed to think they were.

¶ If Alexander Humboldt's mother had not married again, we would have had no Alexander Humboldt. Second marriages are like first ones in this: Sometimes they are happy and sometimes not. In any event, I occasionally think that mother-love has often been much exaggerated. Love is a most beautiful thing, and it does not seem to make very much difference who supplies it. Stepmother-love, Lincoln used to say, was the most precious thing that had ever come his way. I know a man who loves his mother-in-law, because

she pitied him. Our Oneida friends had " Community Mothers," who took care of everybody's babies, just as if they were their own, and with marked success, for the genus hoodlum never evolved at Oneida. Grandmother-love served all purposes for little Isaac Newton, just as it did for John Fiske.

John Fiske's grandmother was his first teacher, and she started out with the assumption that genius always skips one generation. She believed that she was dealing with a record-breaker, and she was. What she did not know about the classics was known by others whom she delegated to teach her grandchild.

When her baby genius was just out of linsey-woolsey dresses and wore trousers buttoned to a calico waist, she began preparing him for college. The old lady had loved a college man in her youth, and she judged Harvard by the Harvard man she knew best. And the Harvard man she saw in her waking dreams, she created in her own image. Harvard requires perspective, and viewed over the years through a mist of melancholy it is very beautiful. At close range we often get a Jarrett Bumball flavor of cigarettes and a sight of the foam that made Milwaukee famous. To a great degree, Gran'ma Fiske created her Harvard out of the stuff that dreams are made of. When her little charge was six years old, she began preparing him for Harvard by teaching him to say, " amo, amas, amat."

At seven years of age he was reading Cæsar's

" Commentaries " and making wise comments over his bowl of bread-and-milk about the Tenth Legion; and he also had his opinions concerning the relationship of Cæsar with Cleopatra. At this time he read Josephus for rest, and discovered for himself that the famous passage about Jesus of Nazareth was an interpolation. ¶ When he was eight, he was familiar with Plato, had read all of Shakespeare's plays, and propounded a few hypotheses concerning the authorship of the " Sonnets." ¶ At nine he spoke Greek with an Attic accent. When ten he had read Prescott, Gibbon and Macaulay; and about this time, as a memory test he wrote a history of the world from the time of Moses down to the date of his own birth, giving a list of the greatest men who had ever lived, with a brief mention of what they had done, with the date of their birth and death.

This book is still in existence and so far as I know has never been equaled by the performance of any infant prodigy, save possibly John Stuart Mill.

When twelve years of age he had read Vergil, Sallust, Tacitus, Ovid, Juvenal and Catullus. He had also mastered trigonometry, surveying, navigation, geometry and differential calculus.

Before his grandmother had him discard knee-breeches, he kept his diary in Spanish, spoke German at the table, and read German philosophy in the original. The year he was sixteen he wrote poems after Dante in Italian and translated Cervantes into English.

At seventeen he read the Hebrew scriptures like a Rabbi, and was familiar with Sanskrit.

Now, let no carpist imagine I have dealt in hyperbole, or hand-illumined the facts: I have merely stated some simple truths about the early career of John Fiske.

One might imagine that with all his wonderful achievements this youth would be top-heavy and a most insufferable prig. The fact was, he was a fine, rollicking, healthy young man much given to pranks, and withal generous and lovable.

He was admitted to Harvard without examination, for his fame had preceded him. Students and professors alike looked at him in wonder.

At Cambridge, as if to keep good his record, he studied thirteen hours a day, for twelve months in the year. He ranged through every subject in the catalog, and all recorded knowledge was to him familiar.

Prophecies were freely made that he would eclipse Sir Isaac Newton and Humboldt. But there were others who had a clearer vision.

John Fiske made a decided success in life and left his personality distinctly impressed upon his time, but it is no disparagement to say of him that Autumn did not fulfil the promise of Spring. And Fiske himself in his single original contribution to the evolution crusade explains the reason why.

Professor Santayanna of Harvard once said that John Fiske made three great scientific discoveries, as follows:

1. As you lengthen a pigeon's bill, you increase the size of its feet.
2. White tomcats with blue eyes are always deaf.
3. The extent of mental development in any animal is in proportion to its infancy or the length of time involved in its reaching physical maturity.

Waiving Numbers One and Two as of doubtful value, Number Three is Fiske's sole original discovery, according to his confession. Further, Huxley quotes Fiske on this theme, and adds, "The delay of adolescence and the prolonging of the period of infancy form a subject, as expressed by Mr. Fiske, which is worthy of our most careful consideration."

Rareripes fall early. John Fiske's name was coupled, as we have seen, with those of Newton and Humboldt. Newton died at eighty-six, Humboldt at ninety. These men developed slowly: the hothouse methods were not for them. Fiske at twenty knew more than any of them did at forty. Fiske at twenty-five was a better man mentally and physically than he was at thirty-five. At forty he was refused life-insurance because his measurement east and west was out of proportion to his measurement north and south.

He used often to sit at his desk for fifteen hours a day, writing and studying. The sedentary habit grew upon him; the vital organs got clogged with adipose tissue. The doctor told him that "his diaphragm was too close to his lungs"—a cheerful proposition, well worthy

of a small, mouse-colored medicus who dare not run the risk of displeasing a big patient by telling him the truth, that is, that deep breathing and active exercise in the open air can never be replaced through the use of something poured out of a bottle.

People who eat too much, drink too much, smoke too much, and do not exercise enough, have to pay for their privileges, even though they are able to work differential calculus with one hand and recite Xenophon's " Anabasis " backward. They all have the liver and lungs too close to the diaphragm, because that damnable invention of Sir Isaac Newton's slumbers not nor sleeps, and all the vital organs droop and drop when we neglect deep breathing. Inertia is a vice. The gods cultivate levitation, which is a different thing from levity, meaning skyey gravitation, uplift, aspiration expressed in bodily attitude. When levitation lets go, gravity doubles its grip.

The Yogi of the East know vastly more about this theme than we do, and have made of deep breathing an art. Carry the crown of your head high, hold your chin in, and fill the top of your lungs by cultivating levitation. We are gods in the biscuit!

# JOHN FISKE

AFTER four years at Harvard and the regulation two years at the Harvard Law School, John Fiske opened an office in Boston and gave his shingle to the breeze. No clients came, and this was well—for the clients. Also, for John, The law is a business proposition: its essence is the adjustment of differences between men, the lubrication of exchange, getting things on! Learned men very seldom make good lawyers. Law is a very practical matter, and as for " Law Latin," it can be learned in a week and then should be mostly forgotten. The lawyer who asks his client about the " causa sine qua non," or harangues the jury concerning the " ipse dixit " of " de facto " and " de jure," will probably be mulcted for costs on general principles.

" I always rule hard against the lawyer who quotes Latin," said a Brooklyn judge to me the other day. Happily, Law Latin is now not used to any extent, except in Missouri.

No more clients came to John Fiske than did to Wendell Phillips, who once had a law-office on the same street. So John sent letters to the newspapers, wrote book-reviews, and contributed essays to the " Atlantic Monthly." Occasionally, he would lecture for scientific clubs or societies.

While still in the Law School he had discounted the future and married a charming young woman, who believed in him to an extent that would have made the

average man pause. ¶ Marriages do not always keep pace exactly with the price of corn.

Receipts in the Fiske law-office were not active. John Fiske was twenty-six; his grandmother was dead, and family cares were coming along apace, all according to the Law of Malthus.

He accepted an offer to give substitute lectures at Harvard on history, for a professor who had gone abroad for his health. This he continued, speaking for any absentee on any subject, and tutoring rich laggards for a consideration. Good boys, low on phosphorus, used to get him to start their daily themes, and those overtaken in the throes of trigonometry he often rescued from disgrace.

Darwinism was in the saddle. Asa Gray was mildly defending it. Agassiz stood aloof, clinging to his early Swiss parsonage teachings, and the Theological Department marched in solid phalanx and scoffed and scorned. Yale, always having more theology than Harvard, threw out challenges. Fiske had saturated himself with the ideas of Darwin and Wallace, and his intellect was great enough to perceive the vast and magnificent scope of "The Origin of Species." He prepared and read a lecture on the subject, all couched in gentle and judicial phrase, but with a finale that gave forth no uncertain sound.

The Overseers decided to ask Fiske to amplify the subject and give a course of lectures on the Law of

Evolution. ¶ The subject grew under his hands and the course extended itself into thirty-five lectures, covering the whole field of natural history, with many short excursions into the realms of biology, embryology, botany, geology and cosmogony.

Fiske was made assistant librarian at a salary of one thousand dollars a year. It was not much money, but it gave him a fixed position, with time to help the erring freshman and the mentally recalcitrant sophomore handicapped by rich parents. For seven years Fiske held this position of assistant librarian, and hardly a student at Harvard during those years but acknowledged the personal help he received at the hands of John Fiske. Knowledge consists in having an assistant librarian who knows where to find the thing.

Fiske's thirty-five lectures had evolved into that excellent book, "Outlines of Cosmic Philosophy." The public were buying it.

Evolution was fast taking its place as a fixed fact. And John Fiske was moving into public favor on the flood-tide. There were demands for his lectures from various schools, colleges and lyceums, throughout the United States ℵ ℵ

He resigned his position so as to give all his time to writing and speaking. And Harvard, proud of her gifted son, elected him an Overseer of the University, which position he held until his death. John Fiske died in Nineteen Hundred One, suddenly, aged fifty-nine.

# JOHN FISKE

NEXT to the originator of a great thought is the man who quotes it," says Ralph Waldo Emerson. Next to the discoverer of a great scientific truth is the man who recognizes and upholds it. The service done science by Fiske is beyond calculation. Fiske was not a Columbus upon the sea of science: he followed the course laid out by others, and was really never out of sight of a buoy. He comes as near being a great scientist, perhaps, as any man that America has ever produced.

America has had but four men of unmistakable originality. These are: Franklin, Emerson, Whitman and Edison. Each worked in a field particularly his own, and the genius of each was recognized in Europe before we were willing to acknowledge it here. But the word " scientist " can hardly be properly applied to any of these men. For want of a better name we call John Fiske our greatest scientist. He was the most learned man of his day. In the realm of Physical Geography no American could approach him. The combined knowledge of everybody else was his: he had a passion for facts, a memory like a daybook, and his systematic mind was disciplined until it was a regular Dewey card-index. ¶ Louis Agassiz was born in Europe, but he was ours by adoption, and he might dispute with Fiske the title to first place in the American Pantheon of Science, were it not for the fact that the Law of Evolution was beyond his ken, being obscured by a marked, myopic, theological,

stigmatic squint. ¶ Agassiz died in his sins, unconvinced unrepentant, refusing the rite of extreme unction that Asa Gray offered him, his sensitive spirit writhing at mention of the word "Darwin." On his tomb, Clio with moving finger has carved one of his own sentences, nor all your tears shall blot a line of it. And these are the words of Agassiz: "Darwinism seeks to dethrone God, and replace Him by a blind force called the Law of Evolution." So passed away the great soul of Louis Agassiz

Fiske has been called the Huxley of America; but Fiske was like Agassiz in this, he never had the felicity to achieve the ill-will of the many. Fiske has also been called the Drummond of America, but Fiske was really a Henry Drummond and a Louis Agassiz rolled into one, the mass well seasoned with essence of Huxley. John Fiske made the science of Darwin and Wallace palatable to orthodox theology, and it is to the earnest and eloquent words of Fiske that we owe it that Evolution is taught everywhere in the public schools and even in the sectarian colleges of America today.

The almost universal opposition to Darwin's book arose from the idea that its acceptance would destroy the Christian religion. This was the plaintive plea put forth when Newton advanced his discovery of the Law of Gravitation, and also when Copernicus proclaimed the movements of the earth: these things were contrary to the Bible! Copernicus was a loyal Catholic; Sir Isaac

Newton was a staunch Churchman; but both kept their religion in water-tight compartments, so that it never got mixed with their science. Gladstone never allowed his religion to tint his statesmanship, and we all know businessmen who follow the double-entry scheme ☙ ☙

That famous French toast, "Here 's to our wives and sweethearts—may they never meet!" would suit most lawyers just as well if expressed this way. "Here 's to our religion and our business—God knows they never meet."

¶ To Sir Isaac Newton, religion was something to be believed, not understood. He left religion to the specialists, recognizing its value as a sort of police protection for the State, and as his share in the matter he paid tithes, and attended prayers as a matter of patriotic duty and habit.

Voltaire recognized the greatness of Newton's intellect, but he could not restrain his aqua fortis, and so he said this: "All the scientists were jealous of Newton when he discovered the Law of Gravitation, but they got even with him when he wrote his book on the Hebrew Prophecies!" Newton wrote that book in his water-tight compartment.

But Newton was no hypocrite. The attitude of the Primrose Sphinx who bowed his head in the Church of England Chapel—the Jew who rose to the highest office Christian England had to offer—and repeated Ben Ezra's prayer, was not the attitude of Newton. Darwin waived

religion, and if he ever heard of the Bible no one knew it from his writings.

Huxley danced on it. Tyndall and Spencer regarded the Bible as a valuable and more or less interesting collection of myths, fables and folklore tales. Wallace sees in it a strain of prophetic truth and regards it as gold-bearing quartz of a low grade.

Fiske regarded it as the word of God, Holy Writ, expressed often vaguely, mystically, and in the language of poetry and symbol, but true when rightly understood

And so John Fiske throughout his life spoke in orthodox pulpits to the great delight of Christian people, and at the same time wrote books on science and dedicated them to Thomas Huxley, Bishop of all Agnostics.

To the scientist the word " supernatural " is a contradiction. Everything that is in the Universe is natural; the supernatural is the natural not yet understood. And that which is called the supernatural is often the figment of a disordered, undisciplined or undeveloped imagination

Simple people think of imagination as that quality of mind which revels in tales of fairies and hobgoblins, but imagination of this character is undisciplined and undeveloped. The scientist who deals with the sternest of facts must be highly imaginative, or his work is vain. The engineer sees his structure complete, ere he draws his plans. So the scientist divines the thing first

and then looks for it until he finds it. Were this not so, he would not be able to recognize things hitherto unknown, when he saw them; nor could he fit fact to fact, like bones in a skeleton, and build a complete structure, if it all did not first exist as a thought.

To reprove and punish children for flights of imagination, John Fiske argued, was one of the things done only by a barbaric people.

Children first play at the thing, which later they are to do well. Play is preparation. The man of imagination is the man of sympathy, and only such are those who benefit and bless mankind and help us on our way.

¶ John Fiske had imagination enough to follow closely and hold fellowship with the greatest minds the world has ever known. John Fiske believed that we live in a natural universe, and that God works through Nature, and that, in fact, Nature is the spirit of God at work.

¶ Doubts never disturbed John Fiske. Things that were not true technically and literally were true to him if taken in a spiritual or poetic way. God, to him, was a personal being, creating through the Law of Evolution because He chose to. The six days of Creation were six eons or geological periods.

No man has ever been more in sympathy with the discoverers in Natural History than John Fiske. No man ever knew so much about his work as John Fiske. His knowledge was colossal, his memory prodigious. And in all of the realm of science and philosophy, from

microscopy and the germ theory to advanced astronomy and the birth of worlds, his glowing imagination saw the work of a beneficent Creator who stood above and beyond and outside of Natural Law, and with Infinite Wisdom and Power did His own Divine Will.

¶ Little theologians who feared Science, on account of danger to pet texts, received from him kindly pats on the head, as he showed them how both Science and Scripture were true.

He did n't do away with texts, he merely changed their interpretation. And often he discovered that the text which seemed to contradict science was really prophetic of it. John Fiske did not take anything away from anybody, unless he gave them something better in return.

¶ "A man's belief is a part of the man," he said. " Take it away by force and he will bleed to death; but if the time comes when he no longer needs it, he will either slough it or convert it into something more useful."

¶ Every good thing begins as something else. Evolution is at work on the creeds as well as in matter. A monkey-man will have a monkey belief.

He evolves the thing he needs, and the belief that fits one man will not fit another. Religious opinions are never thrown away: they evolve into something else, and we use the old symbols and imagery to express new thoughts

John Fiske, unlike John Morley, considered " Compromise " a great thing. " Truth is a point of view: let us

get together," he used to say. And so he worked to keep the old, as a foundation for the new.

I once heard him interrupted in a lecture by a questioner who asked, " Why would you keep the Church intact? " The question stung him into impassioned speech which was better than anything in his manuscript. I can not attempt to reproduce his exact language; but the intent was that as the Church was the chief instrument in preserving for us the learning of Greece and Rome, so has she been the mother of art, the inspirer of music and the protector of the outcast. Colleges, hospitals, libraries, art-galleries and asylums, all come to us through the medium of religion.

The convent was first a place of protection for oppressed womanhood

To discard religion would be like repudiating our parents because we did not like their manners and clothes. The religious impulse is the art impulse, and both are manifestations of love, and love is the basis of our sense of sublimity.

We surely will abandon certain phases of religion. We will purify, refine and beautify our religion, just as we have our table etiquette and our housekeeping. The millennium will come only through the scientific acceptance of piety. When Church and State separated it was well, but when Science and Religion joined hands it was better. Science stands for the head; Religion for the heart. All things are dual, and through the marriage

of these two principles, one the masculine and the other the feminine, will come a renaissance of advancement such as this tired old world on her zigzag journeys has never seen. Sociology is the religious application of economics. Demonology has been replaced by psychology, and the betterment of man's condition on earth is now fast becoming the chief solicitude of the Church. ¶ It will thus be seen that John Fiske's hope for the future was bright and strong. The man was an optimist by nature, and his patience and good-nature were always in evidence, He made friends, and he held them. Huxley, who of all men hated piety that was flavored with hypocrisy, loved John Fiske and once wrote this: "There was a man sent from God by the name of John Fiske. Now John holds in his great and generous heart the best of all the Church has to offer; hence I no longer go to prayers, but instead, I invite John Fiske to come and dine with us every Sunday, so are we made better—Amen."

SO HERE ENDETH "LITTLE JOURNEYS TO THE HOMES OF GREAT SCIENTISTS," BEING VOLUME TWELVE OF THE SERIES, AS WRITTEN BY ELBERT HUBBARD: EDITED AND ARRANGED BY JOHN T. HOYLE; TYPOGRAPHY BY CHARLES J. ROSEN AND AXEL EDWARD SAHLIN; PRESSWORK BY JOHN HALL AND PETER ZIMMER; BORDERS AND INITIALS BY ROYCROFT ARTISTS AND BINDING BY CHARLES YOUNGERS ❧ PRODUCED BY THE ROYCROFTERS, THEIR SHOPS, WHICH ARE IN EAST AURORA, ERIE COUNTY, NEW YORK, MCMXVI.